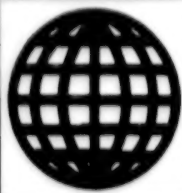


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Central Eurasia

***Military Affairs
Military Digest
No 3, September 1994***

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Central Eurasia

Military Affairs

Military Digest

No 3, September 1994

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Tanks of Russia

95UM0013A Moscow ARMEYSKIY SBORNIK in Russian
No 3, Sep 94 (signed to press 23 Aug 94) pp 2-4

[Article by Colonel General A. Galkin, chief of Russian Federation Ministry of Defense Main Armor Directorate]

[FBIS Translated Text] The first domestic tank left the Sormovo Plant gate on 31 August 1920. Military clashes of the 1930's period, and especially the beginning of World War II, revealed the tank's domineering role on the battlefield, and domestic tank engineering began to develop rapidly in this connection. Vehicles created by the designers and engineers that were first-rate for that time such as the T-28 medium tank, T-35 heavy tank, T-26 light tank, T-27 tankette, BT halftrack tank, and in prewar years the legendary T-34 and KV served as a base for forming our tank troops.

After just 26 years from construction of the first tank, the country and its Armed Forces began celebrating Tanker Day on the second Sunday of every September as evidence of the outstanding services of armored and mechanized troops in the Great Patriotic War and services of the tank builders.

While the first domestic tanks for the most part were light and fast and had only thin armor, already in the 1930's designers and tank builders began developing qualitatively new combat vehicles with armor designed to defeat artillery projectiles and with powerful gun armament. They coped brilliantly with this task. In 1939 a design collective made up of A. Morozov, M. Koshkin and N. Kucherenko created the T-34 medium tank, a masterpiece of world tank engineering. Not in a single world army would there be a tank which served as gloriously and long as our "34." Tank production also increased considerably during the 10 prewar years and their number in the Armed Forces grew by 43 times.

Simultaneously with the increase in tank production, the leadership of the country and Army devoted great attention to training cadres for the tank troops. Junior tank specialists were prepared in training units. Middle-level command personnel and technical personnel trained in armor schools. The RKKA [Workers' and Peasants' Red Army] Academy of Mechanization and Motorization (now the Military Academy of Armored Troops) was established in 1932 and turned out around 1,750 commanders and engineers in the 10 prewar years.

Today the Ministry of Defense Main Armor Directorate is the agency for armored vehicle logistic and training support of troops. Its primary mission is to form an armored vehicle armament and equipment system; ensure high combat and operating qualities of tanks, infantry fighting vehicles, armored personnel carriers and vehicles based on them both in the design

stage as well as in the stage of production and organization of maintenance, repair and storage; provide logistic support to duty in the troops; train junior tank specialists; and prepare officer and scientific cadres.

Headed up in various years by prominent military leaders and outstanding organizers Army Commander 2nd Rank N. Khalepskiy, General of the Army D. Pavlov, marshals of armored troops Ya. Fedorenko, P. Rybalko, S. Bogdanov and P. Poluboyarov, colonel generals A. Radziyevskiy and Yu. Potapov, and Chief Marshal of Armored Troops A. Babadzhanian, the Directorate made an enormous contribution to the job of establishing, developing and strengthening our renowned tank troops.

The organizational structure of tank troops and theory of their combat employment were upgraded in the 1930's. The Great Patriotic War confirmed the correctness of directions chosen in tank engineering and the timeliness of measures for organizational development of the tank troops.

The renowned toilers of the rear made an enormous contribution to the victory of our Armed Forces and their armored vanguard, the tank troops. During the war years our tank builders gave the front 104,000 tanks and self-propelled guns.

Along with design bureau and plant collectives, associates of our armored range, now the Scientific Research Institute of Armored Vehicle Armament and Equipment, played an important role in the development of domestic tank engineering in that period.

Highly skilled military test engineers comprehensively tested each new model, and vehicles would be modified and their combat and operating indicators would be improved based on their recommendations.

The postwar period of tank engineering development is characterized by a search for new directions. At this time second-generation tanks—T-54, T-55, T-62—were being created which by tradition had absorbed all the best that had been put into the design of the legendary "34" and which also won world fame for themselves.

Today, third-generation tanks—T-72, T-80, T-90—are in the inventory of our tank troops. These are powerful fighting vehicles which reflect both the past war's experience and the latest achievements of science and technology. Modern tanks have reliable armor protection, powerful stabilized armament, and improved fire control and vision devices permitting tankers to engage various targets confidently from the move both day and night. They are more maneuverable, have greater range and can negotiate water obstacles without awaiting the construction of crossings.

The demands of modern combined-arms battle as well as the integrated employment of different kinds of

weapons not only seriously changed the design of combat tanks, which in the past war years were the material foundation of the tank troops together with self-propelled guns, but also forced a comprehensive solution to the problem of creating and upgrading new types of armored vehicle armament of the troops. These are the infantry and airborne fighting vehicles (BMP-1, BMP-2, BMP-3 and BMD-1, BMD-2, BMD-3), armored personnel carriers and ATGM combat vehicles.

This year tank soldiers celebrate their professional holiday for the 48th time. Operating today under conditions of the reform and reduction in numerical strength of the Armed Forces, they are not letting up the pace of combat training. At tank training areas and in training classrooms and auditoriums, tankers are strengthening combat readiness, persistently mastering new equipment and improving methods of employing it.

Air Defense 'Umbrella'

95UM0013B Moscow ARMEYSKIY SBORNIK in Russian No 3, Sep 94 (signed to press 23 Aug 94) pp 5-7

[Interview with Major General Vladislav Viktorovich Gorlov, chief of Moscow Air Defense District SAM Troops, by ARMEYSKIY SBORNIK correspondent Lieutenant Colonel N. Moshkin, occasion, date and place not specified; photograph of Gorlov included]

[FBIS Translated Text] From his biography.

Major General Vladislav Viktorovich Gorlov was born in the Crimea in 1940 and has been in the Armed Forces since 1959. He completed Odessa Military-Technical School and the Military Command Academy of Air Defense imeni Marshal of the Soviet Union G. K. Zhukov. He has held positions from a weapon platoon commander to first deputy commander of a separate air defense army. He has served in the Arctic, in the central region of Russia and in the Transcaucasus. Since August 1991 he has been chief of Moscow Air Defense District SAM Troops. Married, with two daughters.

Following the disintegration of the Soviet Union, elimination of the unified air defense system of Warsaw Pact member states and later also elimination of the USSR air defense system, the Moscow Air Defense District became a border district in Russia and held the main place in the structure of national air defense as a whole.

Our correspondent, Lieutenant Colonel N. Moshkin, asked Major General Vladislav GORLOV, chief of District SAM Troops, to tell what is being done to strengthen air defense in the Moscow Air Defense District zone of responsibility.

[ARMEYSKIY SBORNIK] Vladislav Viktorovich, I would like to learn how military reform is affecting the

degree of combat readiness of SAM Troops, the District's main source of firepower.

[Gorlov] The reduction in SAM units of course affects the defense system as a whole, but not as perniciously as many were predicting just quite recently. Although today's military-political, financial, scientific-technical and economic factors far from fully facilitate a balanced development of different types of air defense armament and its entry into service with the troops, 95 percent of District SAM units are outfitted with modern fourth-generation equipment. Unfortunately, the antiquated S-200 long-range system no longer can effectively combat the latest modifications of offensive aerospace weapons, so expenditures for the "300" system are fully justified. This mobile multichannel system is the foundation of our air defense, naturally with consideration of missilemen's high proficiency and responsibility. People understand the District's special importance in the national air defense system. I will remind you that it is located on the territory of 24 Russian oblasts, monitors air space in an area of 1.3 million square kilometers, and borders for which it is responsible extend for 4,000 km overall.

With their air defense "umbrella," formations and units cover more than 140 important military and state command and control facilities and installations of economic importance, including radioactively dangerous ones. Among them are eight atomic electric power stations. Air defense security is provided almost to a third of Russians in all.

[ARMEYSKIY SBORNIK] Now one often can hear talk about the needlessness of air defense. Does the reduction in units and subunits, including SAM units and subunits, confirm this?

[Gorlov] In fact, there have been avalanching attempts of late to "shut down" more than just us, but I dare say our air defense "umbrella" may come in handy for Russians for a long while yet. It is another matter as to whether or not reform and development of the Air Defense Troops will continue in accordance with the Russian Federation Presidential Edict on Organization of Aerospace Defense.

Let us clarify. The need for establishing an aerospace defense is generated by a number of reasons. Military operations that begin with wide-scale, massive employment of offensive aerospace weapons become the most likely now. This has been demonstrated clearly by a number of regional military conflicts. Considering the constant increase in combat capabilities of the entire arsenal of offensive aerospace weapons (unmanned, precision, low-signature, and capable of operating simultaneously from space and from the air) and the ever increasing importance of their first strikes, pre-emption in actions can ensure not only seizure of operational and strategic initiative, but also decide the outcome of war. This is why it is still early for us to put

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slip-covers on the missiles, figuratively speaking, let alone yield to the euphoria of the numbers.

Field trials of the capital air defense system conducted after its up-arming and the automated alert zone being created that warns of the flight of cruise missiles allow us to stand firmly on our own feet without forgetting about the possibility of the appearance of unforeseen situations. We are speaking of the fact that the present district air defense system can simultaneously destroy up to 500 targets, each with a minimum radar cross-section of several square decimeters (like the cruise missile, an "invisible" stealth aircraft reflects many parts of a square meter).

[ARMEYSKIY SBORNIK] Behind such impressive figures not only is first-rate combat equipment operating without troubles in special test exercises, but also evidently the day-to-day military routine of missilemen. Is this so?

[Gorlov] Based on results of the last inspection, one can say with confidence that personnel of the District SAM Troops are not casting the people's money to the wind. There was a mobile move of reduced-strength combat teams of three SAM battalions from different regions of European Russia to a southern range. They were aroused from an alert duty operations mode, which previously had not been done in the Russian Army. The S-300 SAM system teams knocked down all target missiles flying at a speed of 600-800 m/sec at altitudes from 300 m to 2 km. The result was in keeping with the work put in. Over ten persons were rewarded with valuable gifts and monetary bonuses, and SAM brigade commanders lieutenant colonels S. Rutskiy and S. Chukarin were promoted to the next rank ahead of schedule. Or take another example. During one tactical exercise over a hundred airborne vehicles entered the SAM envelope around Moscow almost simultaneously at different speeds and altitudes. All were destroyed within five minutes.

On the whole, almost half of the SAM regiments underwent a range test in the past training year. The effectiveness of fire was 95-96 percent.

[ARMEYSKIY SBORNIK] What is the situation now, especially with combat training and performance of alert duty? Are funds sufficient for this?

[Gorlov] I will be frank. The chronic money shortage hits mercilessly. While problems of individual proficiency and team training are being solved successfully, trips to the range and tactical field fire exercises most often are an insoluble problem.

You can't jump over your head, as they say. In just the last quarter of the current year the District was several tens of billions of rubles in debt to "state" sponsors. There is nothing with which to settle accounts. By the way, the S-300 system must fire 2-4 missiles in order to guarantee knocking down one cruise missile. This costs

approximately a third of a billion rubles. Operating mobile SAM systems is expensive for us (but you cannot get away from this). I will not mention POL, which is half the trouble. The trouble is that specialists who drive heavy combat vehicles are nowhere to be gotten. Such skilled craftsmen are no longer being prepared for the Army in civilian life and we do not have time for this for now for familiar reasons. Nowadays our officer is both behind the wheel and in the boiler room, and the guard detail does not get by without him. We call all this a temporary phenomenon and growing pains, which have been exacerbated with the beginning of military reform, but there is a limit to everything, including also to the moral and mental self-control of military professionals.

[ARMEYSKIY SBORNIK] The shortage of personnel in units of the District SAM Troops is being met partially by officer teams, but they are not a panacea against all troubles. Where can a solution to the situation at hand be sought?

[Gorlov] Forced resource restrictions led almost to a ten percent reduction in the numerical strength of troops. This will require considerable work to reorganize many units and subunits. The problem still remains acute at the present time. We are resting great hopes on an increased number of NCO's and privates serving under contract. There now are 11,000 of them in the District, of whom half are women. By the end of the current year we plan to bring the number of contract personnel up to 30 percent of the number of positions previously held by first-term personnel. And there is no discrimination here against representatives of the "weaker" sex. They have given a superb account of themselves in a number of main combat specialties. They are distinguished by a high degree of responsibility, diligence and efficiency, especially as the troops already have experienced several reductions. We also are ready for the new stage, of course with consideration of the fact that there is a certain numerical strength limit impossible to overstep.

[ARMEYSKIY SBORNIK] Otherwise the most important thing, the degree of troop combat readiness, is lost. Did reform of the command and control apparatus affect it?

[Gorlov] It is rather difficult and for now premature to answer this question categorically. For example, only a fifth of the former personnel have remained in the District Department of SAM Troops. They work directly on combat employment. Automated control system engineers and specialists went into the armament service, and those who were in charge of combat training went into a similar department. That distribution of officers is characteristic of the Ground Troops. We will see the extent to which their experience is suitable for us.

Now a reduction is planned in the headquarters of regiments and in the division makeup (by two-thirds), with their subsequent reorganization into other structures.

Nevertheless, we continue to rehearse troop actions in all kinds of operations in order to improve proficiency and coordination of command and control entities. Command and staff exercises remain their basic form of training at the present time. The periodicity of their conduct is determined by the need for maintaining a high degree of combat readiness of command and control entities with the reduction in financial and material expenditures.

We will work on developing teamwork and coordination of large strategic formations, formations and units with the completion of the reduction in numerical strength of troops and of transition to the new organizational structure, and with the formation of air defense zones and areas. We will hold command and staff exercises, headquarters training drills and war games with simulated operations (combat operations). It is well that we are not experiencing a shortage of computers and automated control systems.

[ARMEYSKIY SBORNIK] The District not only is reducing units and command and control entities, but also is receiving replacements from the Baltic countries. What awaits the newly arrived missilemen?

[Gorlov] In fact, units from Lithuania and Latvia are being transferred to us. Unfortunately, it is not everywhere that they are awaited by prepared positions and that families of officers and warrant officers are awaited by housing with modern amenities. Many will have to await completion of one 60-apartment and two 150-apartment houses, construction of which will be accelerated.

In completing the conversation, I would like to note that the air defense system has reliably covered Moscow and central Russia for 40 years. It has withstood the test of time more than once. I am sure that subsequent years also will be no exception. Today's changes within the scope of military reform will not deprive our armed defenders of what is important—the desire to do everything possible to strengthen air defense and preserve our homeland's might.

THE ARMY: PROBLEMS, SOLUTIONS

Conversion Strategy: To Assist Instructors, Post-Graduate Students, Students and Cadets

95UM0013C Moscow ARMEYSKIY SBORNIK in Russian No 3, Sep 94 (signed to press 23 Aug 94) pp 8-11

[Article by L. Yefanov, candidate of economic sciences, under rubric "Military Economics and Finances"]

[FBIS Translated Text] Building a market economy is a very important element in forming a new, free society. This process now is negotiating an important

and at the same time painful stage, since it is running up against the brick wall of an economy militarized to the maximum extent throughout CIS territory. This is explained above all by that special role which the military sphere played in the former USSR's national economy: there was an intensive buildup of military might over long decades that greatly exceeded defense needs. Priorities in the country's economy invariably were given to development of the military-industrial complex through centralized redistribution of the best means and resources from other spheres and sectors. A gigantic potential gradually formed in the military-industrial complex...

As of today this complex is the largest aggregate consumer of financial, material, labor and intellectual resources of the Russian national economy. According to assessments of the Russian Academy of Sciences Economics Institute, it devours approximately 30-35 percent of budgetary expenditures, 65-70 percent of capacities of metalworking equipment, 40 percent of electrical power, over 30 percent of motor transport equipment, and also 50 percent of metal, motor fuel, oils and so on. The military-industrial complex continues to have the country's highest scientific research and technological potential: 85-90 percent of scientists and engineers of specialties other than the humanities are employed here to one degree or another.

The transition to the market in Russia can be made only through demilitarization of the entire national economy. On the other hand, the work of the military-industrial complex itself must be built on market principles. A unique contradiction arises from this, and under our conditions conversion is the means of resolving it. Only conversion is capable of giving the economy a qualitatively new status, genuinely changing the system of economic management and activating market capabilities to the maximum.

Now I will focus readers' attention on political-economic questions of converting military production. To carry out conversion successfully, it is necessary above all to form a program of measures for conducting it based on a unified theoretical concept which reveals as the ultimate goal a fundamentally new technological, economic and international status of our society. The presence of a clear concept will permit avoiding actions by the so-called trial-and-error method and will determine reliable reference points in choosing alternative options for transformations.

A certain period of historical comprehension is required for a fair, correct assessment of all problems connected with conversion and with transition of the military-industrial complex to the market. But already today it can be considered as having been proven that in conducting conversion one should avoid taking any one-sided approaches and unjustifiably setting off its individual elements against each other. The domestic experience of conversion during 1989-1992 shows that

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hopes for some kind of "unique" means which allegedly permits solving the country's pressing problems and needs through the military sector are groundless.

In implementing conversion it is necessary to proceed from the assumption that the military production sphere represents a complex, multi-aspect phenomenon encompassing both productive forces and production relationships as well as society's political and cultural superstructure. It is rightfully viewed as an independent subunit of public reproduction. Speaking in favor of this viewpoint is the fact that, first of all, military production is accomplished for special purposes—it is called upon to satisfy a specific social need for the state's defense (or to ensure the state's military interests outside its limits). Secondly, military production has a special consumer of its end product in the person of the Armed Forces, which are a specific economic body (here they have their own material and technical base, infrastructure, command and control structure and so on). Thirdly, the end product itself being created in the military sphere also has no analogues in other spheres from the standpoint of reproduction—it is intended not for creating, but for destroying consumer wealth and does not take a subsequent part in the production cycle. The aggregate effect of these factors dictates the specifics of the constant creation of conditions for new production, i.e., reproduction.

Scientists who share my viewpoint are convinced that it is such an approach that enables obtaining a reliable picture of the potential of the military-industrial complex, determining its true place in the system of public production, and precisely identify ties and relationships with other sectors and spheres of the economy. And this permits taking a methodologically correct approach to developing the conversion concept and outlining sensible strategic directions of its realization.

Unfortunately, another approach has formed in official domestic science and statistics: the military production sphere is included piecemeal in various subunits and spheres of public reproduction (national economy). The result? The conversion which began in 1988 caught Soviet economic science and economic management agencies unawares inasmuch as it proved impossible to determine the true potential of the military-industrial complex and on this basis to create a rational conversion concept and competently define its goals and tasks.

In my view, the time has come to reject the interpretation of conversion that is dominant in our economic literature and that has formed in economic practice as the process of "transition of military industry to a peacetime footing." Its main deficiency is that such a multi-aspect process is limited to the framework of industrial production, and in that case very important stages of reproduction (distribution, exchange and consumption) and spheres of the national economy such as

culture, education, consumer services and so on "drop out." Experience has shown that this does not permit full-fledged conversion to be carried out, since its directions are developed in a fragmentary manner, with real interbranch ties and relations ignored.

One more fundamental deficiency of this interpretation is that conversion is understood here chiefly as a change in the production profile of enterprises. As a result, during 1988-1991 it was reduced in practice basically to reprofiling the capacities for output of military products to the manufacture of civilian products. By the way, as of today around 1,500 enterprises of the military-industrial complex are being reprofiled (approximately 1,000 turned out to be unprofitable). This substantially limited the military sector's capabilities to satisfy peaceful needs through an expansion of its activity. In 1992, for example, the reduction in output of articles here was around 23 percent, while the output of civilian products rose only by 2.5 percent.

Thus, in practice (as well as in theory) conversion ended up being artificially set off against processes of structural change in production such as diversification, integration, intensification and so on that are so important in the era of scientific-technical progress. But the basis of the conversion concept must be an understanding of it as a complex, multi-aspect process of special-purpose change in proportions of all social production aimed at transforming society as a whole through a rejection of the priority development of the military sphere in favor of the civilian sphere. I believe that approach certainly will help create a theoretical base in order to avoid one-sidedness and unsubstantiated contrapositions.

Conversion and demilitarization of the national economy now should be directed toward achieving economic, technological and foreign policy goals. Among them are the following: accelerated formation of a market and intensification of the effect of this process on optimization of production in key sectors of the national economy and on the system of macro- and micro-management of the economy; a transition to a balanced, deficit-free economy capable of reacting quickly to the latest scientific-technical achievements and social needs; overcoming the consumptive nature of social production through wide introduction of resource-conserving high technologies and achievements of scientists of the military-industrial complex; shifting the center of gravity to qualitative parameters of economic growth and scientific-technical progress; strengthening the economy's social orientation, increasing employment by freeing up the labor force from inefficient to the most efficient spheres of military production, and solving problems of ecology and commodity deficiency; changing Russia's present

status in the international division of labor and winning a prestigious place in the world community system through specialization in science-intensive, high-tech products produced in the military-industrial complex; and finally, the formation and technical re-equipping of the Russian Armed Forces on a qualitatively new basis.

Meanwhile, a scientific analysis and the course of world history convince us that the success of any major economic transformation invariably also is determined by non-economic components. These are above all the culture of economic management, the type of social awareness and society's spiritual level, but the most important is the presence of lofty, generally uniting national goals and ideas. Russia's rebirth as a mighty superpower generating pride in its citizens and respect in the world is such a goal now.

The complexity of the economic system of military production requires comprehensiveness in carrying out transformations interrelated by time and character, and it requires consideration of its inherent logic of development and inner contradictions, traditions which have formed, and features of national thinking. In accordance with this it would be correct to believe that broadening its front of activity and achieving integrity of transformations now can become the leading direction in the development of conversion. The absence of comprehensiveness and of a unified, special-purpose direction is the main vulnerable spot of today's market reforms.

One of the most difficult conversion problems is to combine an increase in economic efficiency with consistent observance of principles of social justice and protection. Unfortunately, for some reason their observance in fact is considered a brake on development of market relationships, which leads to a growth of tension in society. Therefore already today it is necessary to proceed from the assumption that conditions of labor and everyday life of present and future generations act as the chief yardstick of the economy's efficiency. It is important to see to it that the principle of social protection not only affects the unemployed and those of scanty means, but also affects a strengthening of prestige of highly productive labor and a growth of incomes in accordance with labor contribution to public wealth.

History indicates that not one major reform gets by without losses. Hence the question "surfaces" as to the "social price" which society definitely will have to pay for conversion. The interests of social and economic justice require putting it on those enterprises, layers and structures which do not keep within social standards of effective economic management and which freeloader on difficulties of the transition period. How

may this be reflected specifically? Above all in different forms of establishment of enterprises, elimination of unprofitable industries, and a market reorganization of the entire system of labor, wages and management.

Ownership of means of production becomes a stumbling-block for conversion measures under conditions of a transition to the market. Now 97 percent of the military-industrial complex potential is in state (government) monopoly ownership. World experience has confirmed more than once that it is impossible to build a real market under those conditions. A need arises for most rapid destatization and privatization, which on the one hand give the manufacturer economic independence and on the other hand directly create a market system, since they lead to freedom of movement of material resources and the labor force, to the circulation of bills and so on.

In evaluating prospects for development of ownership in the defense complex, it must be taken into account that social progress follows the path of an increasingly complex diversity of kinds of economic life, while simplification and uniformity inevitably lead to stagnation. From a practical aspect, such an understanding requires the creation of conditions for development of the diversity and dynamism of different forms of ownership (private, state, joint-stock, collective and so on) and their economic competitiveness. It stands to reason that it is impossible to establish the entire diversity of forms and kinds of ownership in advance, but corporative ownership evidently should be recognized as the main form. This is explained by the high level of socialization and degree of integration of military production.

Establishing a new economic, technological and foreign-economic model of society based on conversion presumes a constant comparison of tactics with strategy, which will permit avoiding consequences of one of the chief defects of the previous conversion practice, when particular local decisions (satisfaction of the demand for individual kinds of consumer goods, kinds of agricultural equipment and so on) got the upper hand over an integral approach, and routine goals (patching "holes" in the agro-industrial complex, the food industry and so on) got the upper hand over strategic tasks.

But problems connected with specific forms and methods of economic management and the directions along which it will be accomplished in fact come to the foreground in the stage of immediate realization of conversion.

In carrying out conversion measures in the present situation, it is necessary to realize that from the standpoint of satisfying the country's peaceful needs, the economic mechanism of military production that took

shape in the past has fully exhausted itself and historically is without prospect. Attempts at preserving and reanimating it under the new authorities in Russia and in other Commonwealth countries may exacerbate the crisis situation in the military-industrial complex even more and lead to serious economic and social consequences.

Thus, conversion tasks simply are unrealizable without a radical transformation of the entire management system and of forms and methods of economic management and without a revision of the main paths for transition of the military-industrial complex to the market.

COMBAT TRAINING

Conduct of the Battalion Defense

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No 3, Sep 94 (signed to press 23 Aug 94) pp 18-23

[Continuation by A. Denisov and N. Shishkin of article begun in VOYENNIY VESTNIK, Nos 1, 2, 4, 5, 1994 and ARMEYSKIY SBORNIK, Nos 1, 2, 1994: "Combat Operations of Ground Troops Subunits: Conduct of the Battalion Defense"]

[FBIS Translated Text]

Defense in the Security Area

A battalion assigned to a forward detachment for operations in the security area when the brigade or regiment conducts a mobile defense as a rule fights on several lines, withdrawing successively from one to another by permission of the commander who sent it out. Making most effective use of natural obstacles (rivers, streams, ravines and so on) is the criterion for choosing lines.

At each line the battalion occupies a defense area, which may be of considerably larger frontage than in a defense under usual conditions because of an increased distance between strongpoints. The latter are disposed so as to ensure interdiction of the most likely avenues of enemy attack and to hold favorable terrain sectors.

The battle formation may be aligned in one or two echelons with the assignment of a reserve or an armored group. The bulk of organic and attached weapons is attached to companies and deployed so that it is possible to conduct fire ahead of the front with the main portion of weapons beginning at maximum ranges, to cover territory adjacent to strongpoints by fire, and to cover the withdrawal of first echelon companies by fire of covering subunits and of forward units withdrawn into the depth in advance. Artillery assigned to support the battalion usually conducts fire from temporary firing positions.

Engagement of the enemy begins back on distant approaches to the security area by personnel and assets of senior commanders. As the enemy approaches, the battalion uses the actions of the patrol, fire ambushes and combat outposts and then the fire of all weapons beginning from maximum ranges to force the opposing side to deploy his main body and attack on an unfavorable axis. Attempts to go around the area or the strongpoints are prevented by a maneuver of the reserve (armored group) to occupy a line of firing positions or to conduct a brief, surprise counterattack; and they also are prevented by artillery fire.

When it arrives at the next line, the battalion immediately occupies a defense and takes steps to restore combat effectiveness. The battle at the new line is conducted in the same manner as at the previous line. The battalion's final defensive line may be the one occupied ahead of the FEBA by combat outposts, in coordination with which it conducts the battle.

When the goal of defense at the first defensive line (force the enemy to deploy the main body and attack on an unfavorable axis) has been achieved and subsequent defense there may lead to heavy losses, the battalion withdraws to the next line by permission of the senior commander. A rear guard and if necessary also flank guards are assigned to counter the enemy's close and wide envelopments during the maneuver. Taking advantage of obstacles emplaced on maneuver routes in advance, the guard forces delay the attackers' advance until the indicated time by fire from in place and from the move and by use of fire ambushes. An airborne assault force landed on withdrawal routes is destroyed or is bypassed after being sealed off.

The battle to hold each position has the goal of delaying the enemy as long as possible, wearing him down physically and inflicting telling blows on him. The battalion commander is obligated to take all steps to keep the enemy from capturing first-echelon company strongpoints without a halt.

In the Great Patriotic War fire ambushes were considered especially effective during battle in the security area. They were used in places where the maneuver of enemy combat vehicles was hampered and at the same time where there were good conditions for observation and conduct of fire and for concealed disposition of the ambush (on edges of the forest and groves, on reverse hillslopes, in bushes, on the outskirts of built-up areas, and in swales and ravines).

Actions of a tank company commanded by Major G. Trupiya reinforced by five self-propelled [SP] guns in the battles at Warsaw in August 1944 serve as a typical example. The company received the mission of moving to the populated point of Zagosciniec (Fig. 1), forcing the Germans to deploy prematurely by a successive defense of lines using fire ambushes, and further slow their advance to the FEBA.

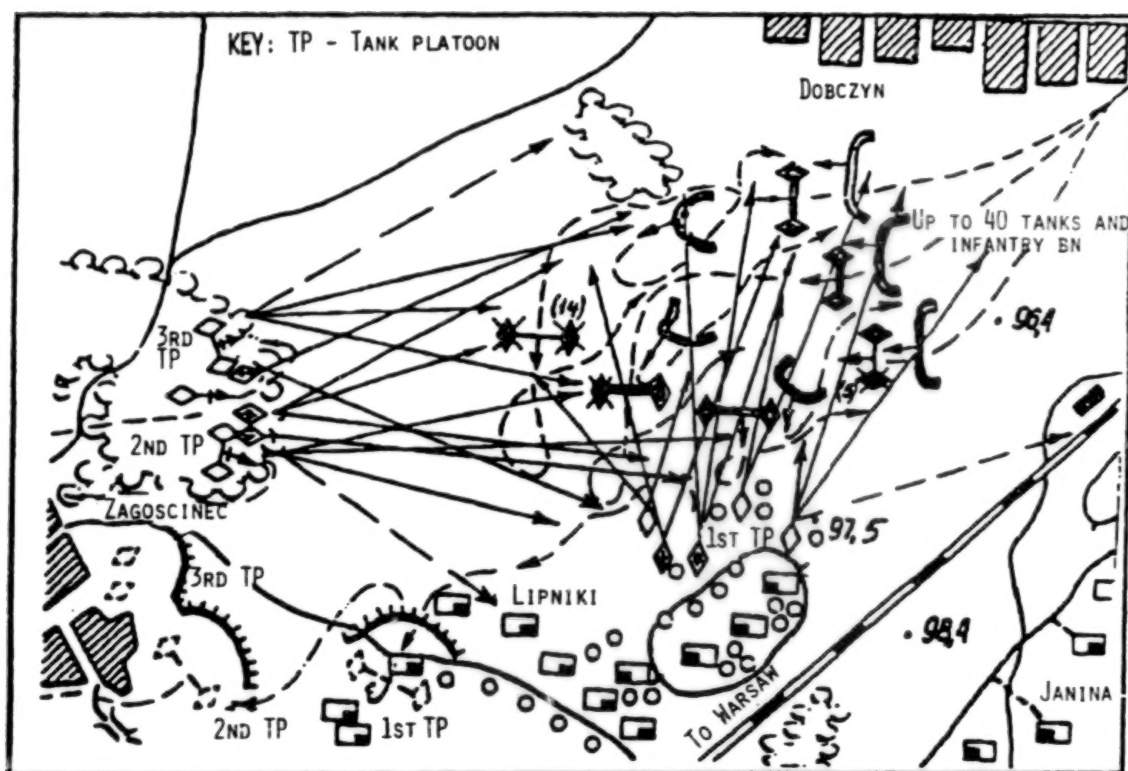


Fig. 1. Example of tank company actions in the Great Patriotic War

On arriving in the first ambush area on the east edge of the woods north of Zagosciniec, the company commander made the following decision: using the fire of tanks and SP guns from ambushes, inflict damage on attacking tanks in the vicinity of the north slopes of Hill 97.5, south edge of Dobczyn, woods (excluded) north of Zagosciniec; have the position of 1st Tank Platoon with two SP guns in the vicinity of Hill 97.5 and the positions of 2nd and 3rd tank platoons with three SP guns on the east edge of the woods northeast of Zagosciniec.

Primary and alternate positions, zones of fire and secondary sectors of fire were determined, emplacements were dug for tanks and SP guns, and reference points and distances to them were indicated. In addition, crews received necessary firing data. They gained a clear understanding of the procedure for commencing and conducting fire and studied movement routes for a change of ambush positions, the coordination signals, and the procedure for maintaining communications.

The fascists launched an attack on the morning of 3 August. A column numbering around 40 tanks and up to a battalion of motorized infantry was moving on the axis of company operations. After passing the southeast edge of Dobczyn and not discovering our tanks,

the enemy changed formation into company and platoon columns and began advancing to the southwest. As soon as the Germans arrived at the line of west outskirts of Dobczyn, Hill 97.5, the company commander radioed a command to 1st Platoon to commence fire. Five tanks were knocked out right away. The others turned left and began advancing on the north outskirts of Lipniki. Having inflicted losses on the enemy and having forced him to deploy with frontage to the south, 1st Tank Platoon began withdrawing to the alternate position. At this moment another ambush (2nd and 3rd tank platoons) commenced fire. Finding themselves under attack from two sides and having lost 14 vehicles, the attackers were forced to withdraw to Dobczyn.

Defense at a Forward Position

The battalion builds a defense at a forward position with separate company and platoon strongpoints interdicting the most likely avenues of attack. Because of increased intervals between strongpoints, subunits are operating on a wider front: the battalion on a front up to 10 km and the company on a front up to 2-3 km.

The forward edge usually is selected behind natural obstacles and on terrain with a clear view in the

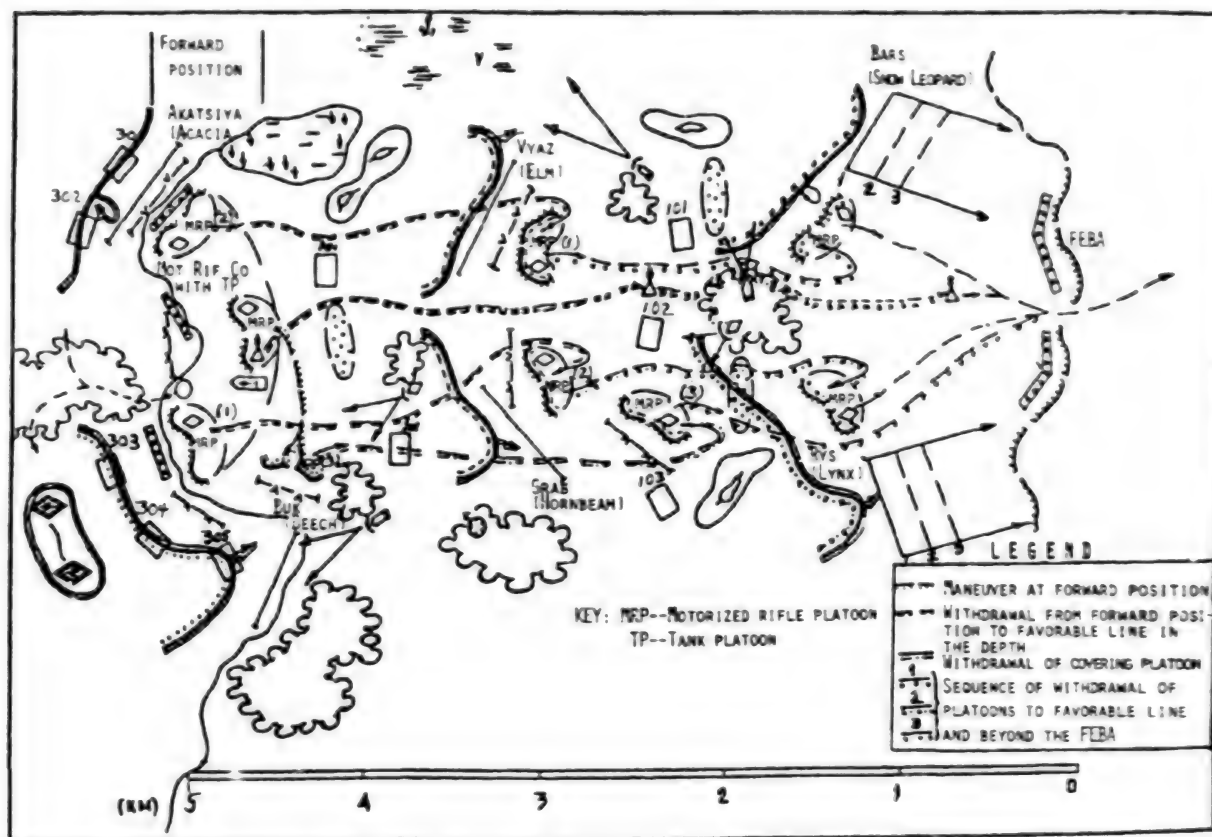


Fig. 2. Motorized rifle company actions at a forward position

direction of the enemy. Sectors of fire are cleared and minefields, abatis and other obstacles are constructed if the situation permits.

The battalion battle is supported by fire of attached artillery, by part of the artillery of the brigade or regimental main body, and by combat helicopters. The system of fire is organized so as to reliably engage the enemy on likely avenues of tank approach from weapons' maximum ranges of fire and to maintain fire coordination among companies (platoons) and adjacent subunits. Special attention is given to organizing antitank fire and engaging attackers in intervals and on the flanks of strongpoints.

With the enemy's approach to the forward position, reconnaissance efforts are aimed at identifying his makeup and probable nature of actions. Attempts of the opposing side's reconnaissance and forward subunits to burst into the depth of the forward position from the move are repelled by specially assigned weapons. Small groups are destroyed or taken prisoner (Fig. 2).

Having determined the enemy's makeup, direction and nature of actions, the battalion commander reports

this to the brigade or regimental commander and arranges for the capture of prisoners and their delivery to higher headquarters. The withdrawal from the forward position is made by order of the brigade or regimental commander in the very same sequence as when operating in the security area. Additionally, sectors for crossing the forward edge of the friendly defense and recognition signals are established, the procedure for cover by artillery fire and by subunits situated on the FEBA is determined, and missions for reconnaissance are updated.

Defense in the First Echelon

Before the beginning of an enemy attack, duty tanks, BMP's (BTR's) and other weapons are assigned in the companies. Taking up alternate or temporary firing positions, they are in constant readiness to destroy individual enemy groups attempting to reconnoiter, breach obstacles or penetrate into the depth of the defense, and they also are in constant readiness to commence fire against low-flying aircraft and helicopters. In addition, they obstruct the enemy's movement within his disposition and prohibit him from conducting engineer work. Snipers kill officers, observers,

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weapon teams and other targets. The other personnel are in readiness to repel enemy assaults, they upgrade engineer preparation of the defense, engage in combat training and service armament and equipment.

Reconnaissance is conducted especially actively at this time. Based on its data and personal observation, the commander determines the degree of enemy preparation for an attack and the beginning of his forward movement and deployment, reports this to the senior commander, updates missions for subordinate subunits and attached artillery, and places them in full readiness.

Small enemy groups and enemy reconnaissance are destroyed by combat outposts. The battalion commander directs their battle and supports them by artillery fire. Major forces approaching the combat outpost position are engaged not only by the fire of organic weapons of the designated platoon, but also by assigned weapons of motorized rifle (tank) companies operating on the FEBA and by artillery fire. In coordination with them, combat outposts destroy chiefly tanks and other armored vehicles ahead of their frontage (Fig. 3). The assigned tanks, antitank weapons, mortars and supporting artillery as well as the senior commander's duty weapons destroy the enemy attempting to bypass the combat outposts and move to their flank and rear. As soon as the enemy deploys his main body, the battalion commander, by authorization of the brigade or regimental commander, issues an order to the commander of combat outposts to disengage and withdraw. The withdrawal is covered by fire of artillery and of assigned weapons of first echelon companies and is accomplished by leapfrogging, taking advantage of terrain irregularities, obstacles and aerosols. A platoon that has withdrawn takes up a position in the company strongpoint or is withdrawn to the battalion reserve.

A reconnaissance in force and an assault by forward enemy subunits is repelled by fire of assigned weapons and by subunits defending on these axes. Weapons which have revealed themselves change positions covertly with the withdrawal of combat outposts and completion of repulse of the assault.

As a rule, an assault by the enemy main body is preceded by fire preparation. Therefore the battalion (company) commander must issue instructions for sheltering personnel, reinforce observation and place duty weapons in readiness. Air defense weapons must be in alert condition No 1. Personnel take cover in slit trenches, dugouts, shelters, BMP's and tanks and on the bottom of emplacements and trenches (Fig. 4), in readiness to quickly take their places at the positions to repel an assault. Subunit commanders and observers observe enemy actions. In this period special attention is given to stopping enemy attempts at breaching minefields and removing obstacles. Fire is conducted by assigned weapons and by snipers against breaching

groups. Passages which have been made are closed, if this is impossible, fire of artillery and other weapons is prepared against them.

With the beginning of fire preparation or with the delivery of nuclear strikes, the commander updates missions for subunits, artillery and other weapons for engaging identified elements of precision weapons, artillery, tanks, other armored vehicles and infantry moving forward or poised for an assault. At the same time he estimates the situation in areas of nuclear strikes and takes steps to close breaches in the battle formation and to restore command and control and the system of fire and coordination.

The reserve (second echelon), armored groups and antitank weapons are used to close breaches. Artillery, tank and BMP fire is concentrated here as well. To restore the system of fire, remaining weapons are assigned sectors of fire overlapping the sectors of fire of weapons which have been disabled.

When the enemy launches the assault, the main efforts of all subunits are aimed at engaging tanks and motorized infantry. A transfer of enemy artillery and mortar fire from the forward edge into the depth of the defense can serve as a sign of the beginning of the assault, but there also is the probability of a dummy transfer of fire in order to force subunits to leave shelters and deliver another fire strike against them.

After the enemy launches the assault, artillery and mortars engage precision weapon installations, tanks and other armored vehicles, put attackers' battle formations into disarray, and create favorable conditions for destroying them by tank and BMP fire, by antitank guided missiles and by other weapons from maximum ranges of fire or launch. Artillery neutralizes enemy air defense weapons during friendly air strikes. Recognition and identification posts and points indicate the location of subunits by prearranged methods in response to commands (signals).

As the enemy approaches the FEBA, defenders destroy his tanks by all means, cut the infantry off from them and complete its destruction by small arms. Fire is concentrated first of all on tanks attacking in the direction of passages in or gaps between minefields in order to force them to maneuver, slow their advance and move onto minefields or other obstacles and barriers.

In the presence of an exposed flank or a large interval with adjacent subunits, enemy attempts to bypass a position are decisively stopped by a concentration of fire against enemy subunits executing a flanking maneuver. Infantry which has penetrated to the FEBA is destroyed by point-blank fire, by grenades and in hand-to-hand combat. The battle for the first trench is waged according to the principle of "not a step backward."

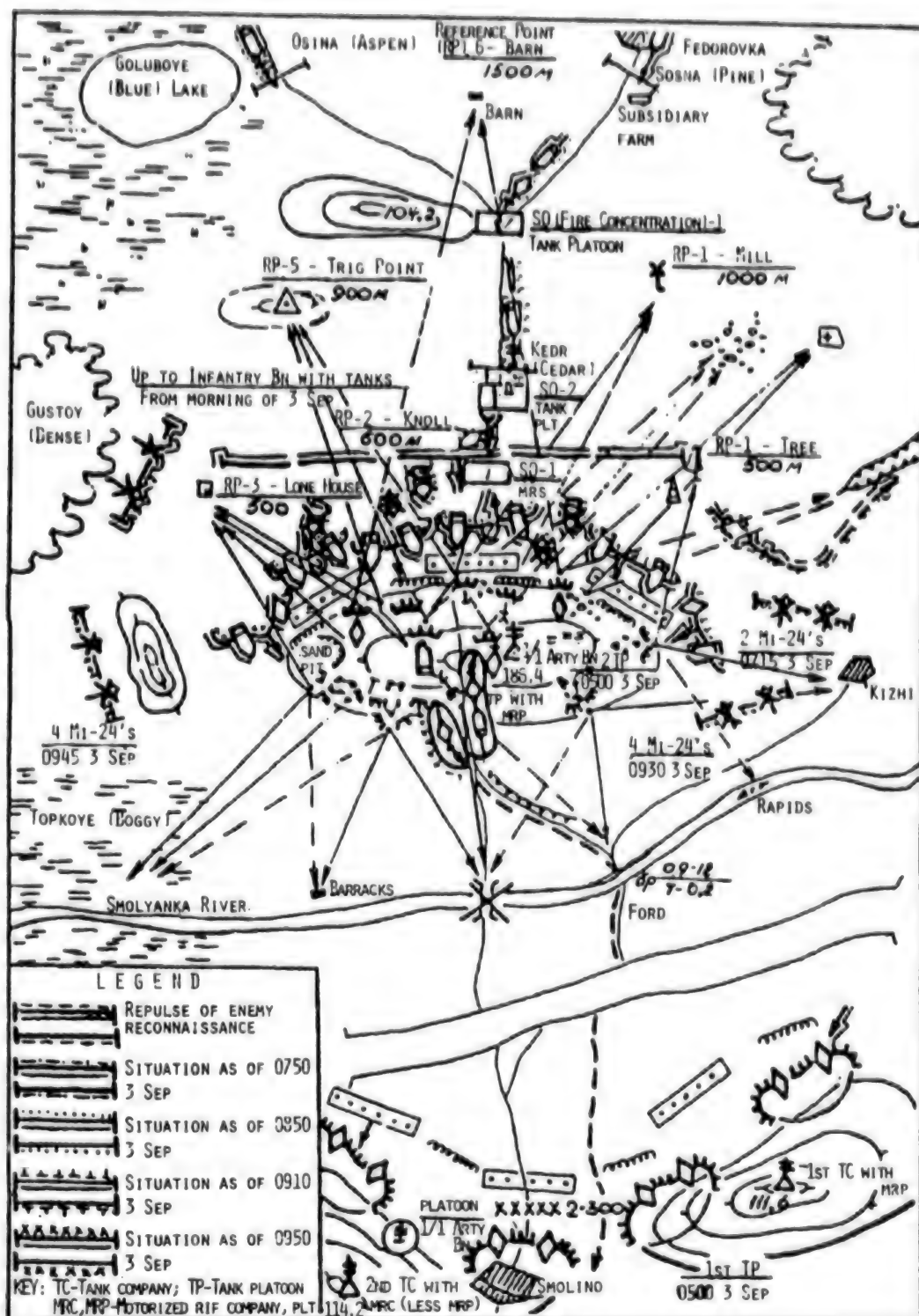


Fig. 3. Tank platoon in combat outposts

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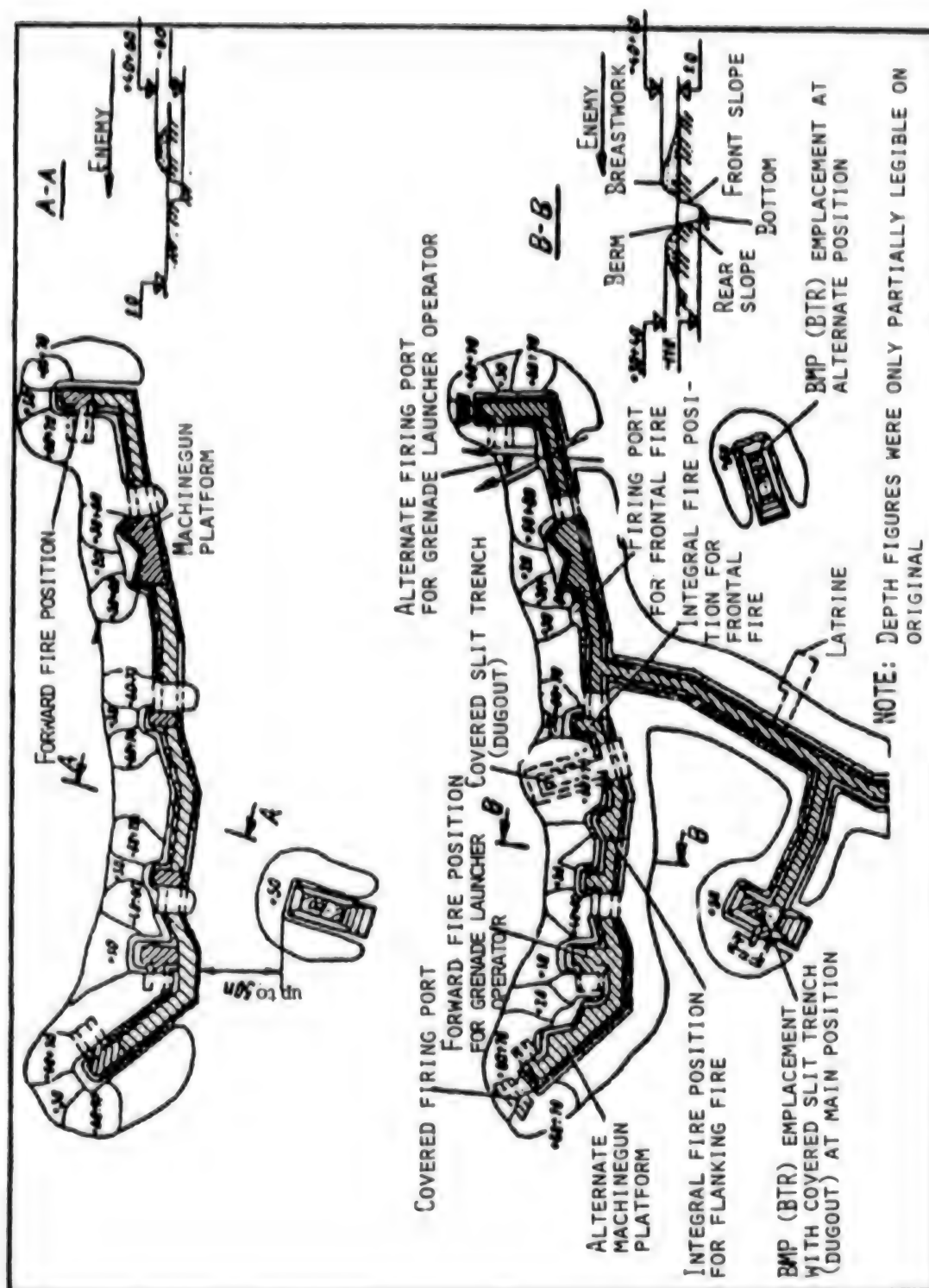


Fig. 4. Squad position

Actions of 2nd Rifle Battalion, 572nd Rifle Regiment in the vicinity of Lake Balaton in March 1945 serve as an example of a stubborn defense. Two German infantry battalions with 25 tanks began an assault, concentrating main efforts against 5th Rifle Company on the battalion left flank. With the enemy's arrival at the FEBA, direct fire from guns commenced against his tanks and dense small arms fire commenced against the infantry. The assault failed. The fascists repeatedly undertook new assaults during the day, but they were unsuccessful thanks to the personnel's staunchness, the commanders' efficiency, and teamwork in actions of artillery, antitank weapons and rifle subunits. Although the battalion was in semi-encirclement, it did not let the enemy by.

Hedgehogs, knife rests and other portable obstacles prepared in advance are set up in trenches and communication trenches to hamper attackers' advance along them. If necessary, tanks and BMP's which are part of armored groups may move forward under cover of aerosols or along concealed routes and take up positions in friendly strongpoints. Air defense gunners as well as motorized rifle and tank subunits not taking part in the battle repel raids by aircraft and helicopters.

In case enemy groupings penetrate a defense area (strongpoint), the battalion (company) commander has to use the fire of all weapons and armored groups to stop them from spreading out laterally and into the depth, reinforce flanks in the penetration sector and neutralize the enemy by fire. In addition, tanks (BMP's) of the second echelon (reserve) may be moved forward to a line of firing positions at this place and antitank subunits may be moved up to a line of deployment prepared on this axis.

Fire ambushes commence fire suddenly on command or independently, above all destroying tanks and other armored vehicles, and force the enemy to attack in an unfavorable direction or onto previously emplaced minefields.

When the enemy bypasses a defense area (strongpoint), the battalion (company) takes up a perimeter defense and often fights in encirclement. In this case it takes steps to reinforce those sectors in which attackers may burst into the defenders' disposition and it uses alternate positions and communication trenches with positions adapted for fire toward flanks and rear. Timely, correct determination of the threatened axis and rapid maneuver assume great importance in encirclement.

After becoming encircled in a grove, 9th Rifle Company, 143rd Guards Rifle Regiment firmly held the strongpoint during the night and day of 5 August 1944, repelling five enemy assaults from different directions. Success was achieved as a result of a correct situation estimate by the company commander and rapid concentration of personnel and weapons on the most threatened axes. A major role also was played by

skillful use of terrain, salients, and the edges and clearings of the grove to set up a system of fire and to maneuver weapons.

After repelling an assault, the battalion (company) commander issues necessary instructions for swift restoration of all elements of the defense alignment, particularly the system of engineer structures, and reports battle results to the senior commander.

(To be continued)

A Commander's Creativeness: Is It Possible?

95UM0013E Moscow ARMEYSKIY SBORNIK in Russian
No 3, Sep 94 (signed to press 23 Aug 94) pp 24-27

[Article by Colonel S. Leonenko]

[FBIS Translated Text] The provisions of regulations and manuals and especially a specific combat mission are mandatory for precise execution. At the same time, commanders have to display reasonable initiative and creativeness and apply stratagem. At first glance this is a contradiction, and some officers do not even attempt to follow this aim, seriously believing that "initiative is punishable."

...The commander in chief of Western Group of Forces was summing up results of an operational-tactical exercise which had ended at Wittstock Training Center. Colonel V. Andriyevskiy, commander, 83rd Guards Motorized Rifle Regiment [MRR], 35th Guards Motorized Rifle Division and Hero of the Soviet Union Lieutenant Colonel F. Pugachev, commander, 33rd Guards MRR, 207th Guards Motorized Rifle Division, were especially singled out as among those who had distinguished themselves: Andriyevskiy for the ability to react promptly and swiftly with personnel and equipment at important points in battle; Pugachev for creativeness in making decisions and the ability to ensure their execution by well coordinated actions of subunits. It must be noted that other commanders, "who on the whole acted correctly but with insufficient initiative" and whose decisions did not contain so-called "zest," reacted very painfully. This reaction is understandable—the commanders' pride was wounded. It was this fact that should have generated a desire in those bypassed to prove themselves more adequately at the next exercise.

But time passes, exercises are held, and results remain the same. And again officers complain that they are fettered in their combat activity by regulating documents, specific missions, their time of execution, the area of responsibility and, finally, detailed organization of coordination. Some even referred to reference notebooks developed not just anywhere, but at the Academy. And they explained Pugachev's success simply: everything is permitted a Hero—both to improvise and to go beyond established bounds!

In my view, such arguments do not stand up to any criticism. Based on service experience I know that any reasoned suggestion of an officer and reasonable initiative always will find understanding on the part of the senior commander. For example, the initial situation established at the beginning of the Wittstock tactical exercise presumed that a politically tense confrontation of sides developed into combat operations, with the "enemy" crossing an artificially created state border in the vicinity of Schweinich [sic; probably Schweinrich] (see diagram). Pugachev's regiment shifted to a defense from the line of march in the division first echelon, interdicting a very passable narrow gap at the Wittstock Training Center. The decision made by the 33rd Guards MRR commander was unpretentious at first glance, and the departure from a "classical" [defense], when only one battalion defends in the first echelon, was explained by the capacity of the training center zone. The other two motorized rifle battalions [MRB] prepared defense areas in the regiment's second echelon to provide growing resistance in the depth.

But further actions by the subunits showed that the regimental commander's concept was considerably more complex. By dawn on 18 June 1990 1st MRB took up a position which could be considered both the first position as well as a forward position and began its engineer preparation. They worked during the day, and so the trace of the forward edge was uncovered in detail by 83rd Guards MRR reconnaissance. But at 0100 hours on 19 June three of the regiment's reinforced motorized rifle platoons (one from each company) demonstratively withdrew 300-500 m into the depth and assumed a defense on a broad front. "Enemy" intelligence also took this into account, having classified that action as a tactic of World War II times of changing positions of the forward edge to avoid losses during fire preparation of the assault. At the same time, the other 1st MRB subunits remained concealed at positions and did not reveal themselves in any way for the rest of the night.

On the morning of 19 June [sic; diagram indicates 19 July] 83rd MRR subunits crossed the "state border" in approach march formations and came under fire of the three platoons from the line which they had occupied during the night. This forced the "enemy" to deploy the main body of advance guards and forward detachments, but having arrived at the line of the FEBA "abandoned" during the night, he came under surprise flanking and close-range concentrated fire. The assault failed and the "enemy" suffered heavy losses. As a result of the "Afghan variant" (in Pugachev's words), 83rd MRR Commander Colonel Andriyevskiy was forced to begin deploying artillery and his main body. Having determined this, after a brief fire assault on the "enemy," 1st MRB disengaged under cover of aerosol screens and executed a swift, concealed maneuver into the depth to the position of the regiment's second echelon.



Practical actions of troops at Wittstock Training Center

But Pugachev's "surprises" also did not end with this. Simultaneously with the 1st MRB maneuver, two motorized rifle platoons, a tank platoon and an anti-tank platoon were moved up to the dummy trench that was at a distance from the true FEBA, and the tank platoon was moved into a flank ambush. This again permitted not only supporting 1st MRB in breaking

contact, but also using surprise fire to halt the "enemy" rushing toward the FEBA. As a result, he was forced to prepare and conduct a five-minute fire assault and renew the assault at 1010 hours.

As regarding this, one regimental commander who had been "ignored" declared categorically after the critique: "Pugachev is playing with his regiment, he is not taking care of his people. Such running about in a defense sector in a combat situation will lead to altogether unjustified casualties!"

It is difficult to agree with this opinion, because the "running about," which essentially is an element of a mobile defense, forced the "enemy" to take more than five hours to cross a zone less than 4 km deep and to suffer no small losses.

By the way, we will note that Pugachev's "enemy," Andriyevskiy, still "outplayed" him. By 1400 hours a portion of 83rd MRR forces had penetrated the 33rd MRR defense in the vicinity of 3rd MRB. To expand the breach into the depth and toward the flanks, the 83rd MRR commander prepared the commitment of his second echelon. Pugachev in turn began moving the reserve forward to eliminate the penetration by a counterattack at 1425 hours on 19 July. But the 83rd MRR commander preempted him by deploying the antitank reserve ahead of the counterattack frontage at 1420 hours, which decided the outcome.

And with respect to losses, an analysis of 1st MRB actions and of the regiment's efforts to support them permitted the assertion that they could have been minimal. The umpires thoroughly studied the measures for misleading the "enemy" which helped achieve high effectiveness. In addition, they were combined successfully with decoy actions and were conducted together with a swift maneuver by subunits and wide use of aerosol assets blinding "enemy" visual reconnaissance.

It is characteristic that the majority of concealment measures were prepared not in the exercise, but in advance. For example, each 1st MRB squad at the forward position had individual screens (for one or two soldiers) made from written-off MKT [authorized camouflage] sets representing rolled-up pieces of net 2x3 m in size with loops and attachments. These home-made screens (they were not in the inventory) permitted quickly camouflaging individual emplacements as well as squad positions to resemble the background of surrounding terrain and practically excluded their visual scrutiny and the conduct of aimed "enemy" fire.

All this indicates that the maneuver's success was no accident. It was prepared seriously in advance and was no improvisation at all, but a creative search by the regimental commander.

Pugachev also approached the disposition of battalion second echelons at the first position in a new way. He reasoned as follows: "Second echelons disposed for a lengthy time out of contact with the enemy, i.e., doing nothing, suffer losses from artillery fire and air strikes since they are tied to their positions." Therefore he decided to remedy this deficiency. After preparing company strongpoints, he covertly removed the 6th and 8th motorized rifle companies from them and dispersed them in platoon columns along clearings and treelines. Calculations preliminarily persuaded the division commander that both the maneuver of companies to threatened axes and closing of breaches on the FEBA could be accomplished almost two times faster, and they also would manage to occupy their strongpoints in time.

The artillerymen also had to do a bit of additional work: battalions of the regimental artillery group changed positions after executing each fire assault. In return, when they subsequently determined the effectiveness of the battalions' change of positions by battery, it was learned that 40 percent of "enemy" artillery fire felled on the abandoned areas. This tactic is far from new, but in Pugachev's opinion it would have been possible to achieve a greater result had there been good, light mockups of artillery systems in the inventory. Then methods of deceiving the "enemy" also would have been simplified. After the self-propelled guns had fired the mission, they would immediately go to new positions, and mockups—and with fire simulators as well!—would be put in their place. Pugachev, though, is not waiting for some kind of new systems and equipment to appear, but finds new things in what is already customary. Thus, according to field fortification manuals, the regiment is required to dig emplacements varying in configuration, and of more than 20 kinds, i.e., a mortar emplacement has one shape, the regimental commander's OP has another, a tank emplacement a third and so on. But knowing the established configurations, the enemy can determine precisely what will be deployed where back when these structures are being prepared, so that no matter how you camouflage emplacements or how covertly you occupy them later, it is of no use! Therefore for a long time the commander strived for what seemingly was a trifle—to make the configuration of all structures uniform at least outwardly. He even prepared his OP in the exercise not as was customary for reputable commanders, with good-quality, high overhead cover, a plank floor and breastwork lining, but used a prepared motorized rifle squad position. He explained this to the umpire simply: it doesn't strike the eye as much, and higher-ups will not find it right away! A joke, of course, but a regimental commander's OP is a priority target for the enemy, while a squad position does not generate special interest, especially in the depth of the defense.

Naturally, such innovations did not generate special enthusiasm in inspectors, especially chiefs of combat

arms and services of the formation, but the division commander took his side, convinced that "at any rate, Pugachev will not spoil things."

Despite such actions, which did not always conform with the manuals, and the practical difficulties in command and control of subunits which arose in this connection, the commander and officers of the staff and headquarters of the regiment understood each other perfectly well. It must be said that the path to this proved to be no simple one. Initially there were staff drills in which Pugachev was not suited either by the form or the content of reports by chiefs of combat arms and services. Many took offense: "...The report was made according to the manual, it was voluminous, but it does not suit the commander!" But Pugachev believed and believes now that in an officer's report on his service there should be only that which the commander does not know at the given moment and, most important, substantiated proposals or what has to be decided by the commander's authority. It was most difficult of all for the chief of intelligence. In contrast to the established form, in any situation he had to formulate the goal of "enemy" actions, i.e., that for which the "enemy" was striving and also how he would achieve this goal, by what means and when. Knowing this, the commander can determine the goal of the regiment's actions and methods of attaining it, and distributed by time and place. All subsequent work both of the commander and of the staff thereby is considerably simplified and, most important, "tied" to specific actions of the enemy and of friendly troops.

As a result of such innovations, the officers stopped making reports with "considerable" wording and of minimal practical value. Therefore both the decisions and the instructions of the regimental commander were distinguished by concreteness and conformed to the maximum extent to the situation at hand, which in turn had a positive effect on work of the staff, and especially of commanders of subordinate, attached or supporting subunits. By the way, as a result of trial-and-error the very content of the concept began to represent a plan for employing regimental personnel and assets. The number of elements of the concept conformed to regulation, but they were set forth in a strict time sequence, which made the decision more specific and facilitated assigning combat missions and organizing coordination. It is characteristic that the regiment preferred to organize coordination on maps and, as soon as the opportunity presented itself, on the terrain. The staff made models, but more for inspectors than for work. Pugachev believes they are of little benefit, being too approximate and imprecise. He once expressed as his personal, "unofficial" opinion concerning sandboxes and models that they were needed more in the Civil War, when commanders did not have military education and maps.

The commander's chief requirement for officers is to have firm knowledge of the concept of the regiment's

combat operations and to know their missions by heart. Therefore in organizing coordination, the need disappeared for writing diverse scenarios of combat operations and for developing other secondary documents. And an officer's ignorance of the terrain was considered simply unbecoming.

A question will arise for the reader here: What is the author calling for? For ignoring regulations and manuals, for anarchy?! In no way. Guidance documents specify provisions and variants of the work methodology of a commander and staff mandatory for execution. Only an officer who knows these provisions and methodologies firmly (in other words, a professional) is capable of improving them for a specific situation. But professionalism is impossible without a manifestation of creativeness, if only because military affairs tolerate no stereotypes and develop continuously, chiefly through practical field training. Sometimes this occurs spontaneously, and for the most part in spite of regulations and manuals published in peacetime. Confirmation of this is the example which has become classical where the tactic of the extended order began to be used as a result of the appearance of firearms on the battlefield. In addition, historical troop experience and military art graphically demonstrate that blindly following conservative views can have a negative effect on the course and outcome of combat operations. It was conservatism in thinking and in determining methods of combat operations that led to the Iraqi Army's defeat in Kuwait. Or, for example, rigid standards for echeloning a particular army only plays into the enemy's hands: it facilitates the work of his reconnaissance in discovering the most important targets. In addition, it is also impossible to exclude the probability that the enemy knows the regulations and manuals as well as the leadership's views on methods of conducting combat operations. Therefore to achieve success it is often enough merely to know the kind of combat operations for which the opposing side is preparing. But a professional always is unpredictable, and enemy uncertainty in the situation estimate inevitably will lead to mistakes in decisionmaking and to nervousness in command and control, which means to defeat.

And the last thing. Armed Forces reform generates a need for developing appropriate field manuals and new guidance documents. This very complicated matter can be resolved only on the basis of practical field training experience. Naturally the majority of valuable suggestions and recommendations developed in the troops will not be able to be realized quickly in guidance documents, since some regulations and manuals at times are in effect for 5-10 or more years. Therefore it is advisable for guidance documents being newly developed to allow commanders a certain freedom in developing decisions and in choosing methods of conducting battle, i.e., to put it briefly, give them an opportunity to act creatively.

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Decisionmaking for Organizing Communications

95UM0013F Moscow ARMEYSKIY SBORNIK in Russian
No 3, Sep 94 (signed to press 23 Aug 94) pp 34-37

[Article by Colonel V. Korovin, candidate of military sciences, and Lieutenant Colonel A. Savelyev]

[FBIS Translated Text] Practical field training persuades us that planning is the most important period in the work of the battalion chief of communications. Its main goal is to determine in a short time the most effective methods of employing personnel and equipment for providing stable, continuous command and control [C²] of subunits in battle. Since this is a rather labor-intensive process, it is important to reduce the time for performing necessary work here.

Communications planning can be done by successive or parallel work methods as well as by a combination of the two. Much depends here on the specific situation and the mission received.

In our view, it is advisable for the chief of communications to break communications planning into three conditional stages: before the commander makes the decision for battle; after decisionmaking; and development of the plan for controlling communications in battle.

In each stage the chief of communications has to perform a rather large number of operations (this was discussed in VOYENNY VESTNIK, No 8, 1990).

But now let us examine the most important actions in decisionmaking for organizing communications, for example, in a motorized rifle battalion [MRB] in the defense.

As a rule, the chief of communications begins his work by studying and gaining a clear understanding of the subunit combat mission and the order from the regimental staff pertaining to communications.

In gaining a clear understanding of the combat mission, it is important for the chief of communications to understand the nature of upcoming combat operations, the battalion mission, its place in the regimental battle formation, the reinforcing personnel and assets, and the procedure for coordination among subunits, and to determine preparation time. This work usually is done during the tactical briefing given by the MRB commander for staff officers and commanders of subordinate subunits.

Based on the combat mission, the following variant can be proposed for gaining a clear understanding of it.

1. 2nd MRB with self-propelled [SP] artillery battalion, 2nd Tank Company, SAM platoon, combat engineer platoon, and radiological and chemical reconnaissance squad shifts to defense of the area Hill 176.8, Hill 251.0.

2. Mission: prevent enemy penetration in the direction of Hill 176.8, Pchelka.

3. The battalion received the following as reinforcement: SP artillery battalion, tank company, SAM platoon, combat engineer platoon, and radiological and chemical reconnaissance squad.

4. 2nd MRB occupies a defense area in the regiment's first echelon and coordinates on the right with 1st MRB of its unit and with 2nd MRB of the adjacent motorized rifle regiment [MRR].

5. Readiness for defense at 0630 hours 9 September.

From the order from the staff of 122nd Regiment pertaining to communications, the chief of communications gains a clear understanding of the following: deployment locations, readiness time, displacement axes of communications centers of C² facilities, procedure for communications with the regimental commander and staff, organization of coordination communications, and use of local lines and the MRR's system of communications in support of the battalion. In addition, he ascertains the following: questions of technical support to communications, procedure for placing communications data into effect, readiness time of communications and time for submitting reports.

Here is a variant of gaining a clear understanding of the order from the 122nd MRR staff pertaining to communications.

1. Communications centers of regimental C² facilities are deployed as follows:

- a. CP—from 1200 hours 8 May in area 200 m northwest of Hill 229.5;

- b. TPU [rear services C² facilities]—from 1600 hours 8 May—forest, Hill 214.4.

2. Communications with regimental subunits is organized as follows:

- a. by radio according to radio operating data of the "Crimson" variant placed into effect as of 0200 hours 9 May; the following radio equipment operating mode is established: before occupying the defense area—operation on transmit is prohibited except for warning and for communications with reconnaissance; with the beginning of and in the course of defensive battle—unrestricted operation of radio equipment on transmit;

- b. by wire means point-to-point from MRR CP with MRB command-observation post [COP];

- c. by mobile equipment according to operating schedule of military postal and courier service station.

3. Provide coordination communications:

- a. with subunit on right (our regiment's 1st MRB) by radio equipment over regimental commander's radio nets and by mutual entry into battalion commanders' radio nets; by wire equipment through 122nd MRR CP communications center;
 - b. with subunit on left (2nd/123rd MRR) by radio equipment by mutual entry into battalion commander's radio net; by wire equipment through 122nd MRR CP communications center;
 - c. with attached SP artillery battalion by personal contact when C² facilities are located together; when located separately, over radio net of attached tanks and over cable communications line via 122nd MRR communications center.
4. With regimental C² facilities disabled, C² of MRR subunits will be provided from 2nd MRB COP. Consequently, radio operating data and reserve communications equipment must be received from 122nd Regiment chief of communications.
 5. Communications equipment repair squad is located in vicinity of MRR CP communications center.
 6. Readiness of communications by 0500 hours 9 May.
 7. Include communications data in action reports daily by 2000 hours.

In the second stage the chief of communications gains a clear understanding of the following from the commander's decision and instructions of the battalion chief of staff: alignment of the MRB and MRR battle formation, missions for subunits and nature of coordination among them, organization and disposition of C² facilities and their displacement axes, procedure for use and operation of communications equipment, and the time for reporting his decision and for readiness of communications.

Here is one variant of the chief of communications gaining a clear understanding of the 2nd MRB commander's decision for battle.

1. Battalion is preparing for defensive battle. Main efforts are being concentrated on the axis Hill 176.8, Pchelka and on holding the area Hill 212.8, Hill 178.6, Hill 251.0 with the mission of preventing enemy penetration in the direction of Hill 176.8, Pchelka.
2. 2nd MRB battle formation is in two echelons: 4th and 5th motorized rifle companies [MRC] in the first and 6th MRC in the second.
3. Engage the enemy as he approaches the FEBA by fire of the regimental artillery group in combination with air and artillery strikes delivered by decision of the senior commander.

When the enemy launches an assault, engage him successively by fire of the regimental artillery group, tanks and ATGM's and, when he reaches the line Sosnovoye, Churayevo, by fire of all battalion weapons.

Engage an enemy who has penetrated by concentrated and barrier fire in coordination with the regimental second echelon in the direction of Pchelka, Hill 176.8. After destroying the enemy, restore the lost position.

4. Coordination in the course of battle is organized among battalion subunits, artillery, air defense weapons, the tank company, combat engineer platoon and radiological and chemical reconnaissance squad.
5. C² of subunits will be exercised from the MRB COP—the road intersection.
6. Readiness for defense is 0630 hours 9 May.

After this the chief of communications begins estimating the communications situation. He essentially does this constantly, beginning with gaining a clear understanding of the combat mission and until the end of battle. Of course the work methodology may differ in each specific instance, but it would appear that the approach will remain unchanged, since the fullest variant is considered here.

ENEMY ESTIMATE

1. In the course of combat operations the enemy will employ both conventional as well as precision weapons. According to intelligence, VHF/UHF [UKV]-band jammers have been deployed against the 2nd MRB communications system.

It should be expected that this equipment will be able to simultaneously jam up to three VHF/UHF radio communication links at the battalion-company level.

In addition, enemy use of expendable jammers in the 30-76 MHz band and the operation of his raiding and reconnaissance parties is not precluded.

2. Conclusions. The communications system may be subjected to rather heavy enemy fire pressure. Therefore a communications reserve must be established.

It is also important to provide measures for protecting the communications system against fire pressure and against enemy COMINT, ECM and precision weapons; for rapid restoration of main communications links that have been disabled; for prompt transfer of battalion C² to the 6th MRC COP (if necessary); and for maskirovka [lit. "camouflage", however, includes "concealment" and "deception"—FBIS] and engineer preparation of elements of the communications system.

The battalion chief of staff must be asked to conduct final reconnaissance and achieve destruction of enemy jammers.

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FRIENDLY TROOP ESTIMATE

1. 2nd MRB is the regiment's first echelon and is occupying a defense area.

Planned scope of battle: 3-5 km laterally and 1.5-2 km in depth.

Battalion battle formation in two echelons. The most important missions are performed by 4th and 5th MRC's and the tank company. In the course of battle, coordination is organized among first echelon subunits and the artillery.

2nd MRB COP deploys at the road intersection. Alternate area is the treeline. In case the battalion COP is disabled, C² is transferred to 6th MRC COP.

2. Conclusions. The force composition, missions, scope of defensive battle and C² of subunits will cause no difficulties in organizing communications.

The most stable communications should be provided with 4th and 5th MRC's, the tank company, SP artillery battalion, SP artillery batteries, antitank platoon and SAM platoon.

Reliable coordination communications must be organized among first echelon subunits and artillery in repelling an enemy assault.

Think out the question of maintaining continuous communications when the battalion COP displaces.

For prompt transfer of C² to 6th MRC COP, issue radio operating data to its commander.

Readiness of the defense by 0630 hours 9 May.

ESTIMATE OF COMMUNICATIONS SYSTEM AND SIGNAL SUBUNITS

1. To provide reliable C² in defensive battle, it is necessary to organize communications by wire and radio equipment and by foot messengers.

During battle, operation of communications largely will depend on precise coordination of signal subunits of 2nd MRB and the SP artillery battalion and tank company equipment.

Battalion companies and platoons have a strength level of 95 percent communications equipment and 97 percent personnel, but around 80 percent of communicators have no combat experience.

Communications equipment losses will be replaced by having it restored by the regimental signal company repair squad. Receipt of additional radios, telephone sets and cable is not expected.

The battalion is short the following equipment: signal platoon—1 R-159, 3 R-158's, 2 TA-57's, 1 km of P-274M; SP artillery battalion headquarters platoon signal squad—1 R-159, 0.5 km of P-274M.

2. Conclusions. The MRB signal platoon and the communications personnel and equipment of attached subunits are capable of performing C² missions in defensive battle.

A class and an exchange of experience should be held with communicators on providing communications under conditions of enemy use of ECM equipment and precision weapons.

It is necessary to organize coordination of signal subunits of the MRB and the SP artillery battalion, and also with tank company communicators.

For rapid restoration of communications equipment which has received combat damage, it is necessary to organize its prompt collection and dispatch for repair. Reconnoiter communications equipment at the site of the upcoming battle.

ESTIMATE OF COMBAT OPERATIONS AREA

1. Terrain is moderately rough. Road network satisfactorily developed. Movement along roads hampered; soil is hard. This will complicate laying cable in the ground.

Rainy weather expected with air temperature to +10° during the day and to -2° at night. Wind 10-12 m/sec.

Populace in combat operations area is hostile; therefore acts of sabotage are possible.

2. Conclusions. Physical-geographic conditions of terrain will not create special difficulties in providing communications, but security of communications center and cable lines must be provided.

TIME ESTIMATE

1. The season is spring, the month is May. Sunrise at 0430, sunset at 2025, length of day 15 hours 55 minutes.

2. Conclusions. Order pertaining to communications received from regimental staff at 1400 on 8 May. Report decision for organizing communications at 2000 hours today.

Carry out full extent of work of planning communications and assigning missions to appointed persons in 6 hours.

Communications readiness at 0500 hours 9 May. This means it is necessary to begin setting up 2nd MRB communications system from 0400 hours 9 May.

Experience shows that this time is fully sufficient to keep within the prescribed deadline. It is advisable to allocate it as follows:

- gaining a clear understanding of initial data30 minutes;
- situation estimate30 minutes;
- decisionmaking60 minutes;
- development of documents210 minutes;
- mission assignment30 minutes.

As a result of gaining a clear understanding of the mission and the situation estimate, the chief of communications makes the decision, in which he specifies the following: concept, missions for signal subunits and organization of coordination among them, procedure for comprehensive provision of communications, and also how communications will be controlled and how educational work will be carried out.

This question was examined in very great detail in the article by Lieutenant Colonel N. Novgorodskiy and Lieutenant A. Stavenko (VOYENNY VESTNIK, No 8, 1990). Therefore it makes no sense to dwell on it here, but it would appear advisable to cite the variant of the decision by the 2nd MRB chief of communications for organizing communications in the defense.

For complete and quality performance of communications missions, the chief of communications decided the following:

1. Have stable communications with 4th and 5th MRC's, SP artillery battalion, tank company, anti-tank platoon, SAM platoon and combat outposts.
 2. Organize communications in the battalion and provide it as follows:
 - a. by radio equipment:
 - with regimental commander and staff according to order from 122nd MRR staff pertaining to communications;
 - to 2nd MRB commander with 4th, 5th and 6th MRC's, SP artillery battalion, tank company, SAM platoon, antitank platoon, combat engineer platoon, logistic support platoon, maintenance platoon and radiological and chemical reconnaissance squad over the battalion commander's radio nets.
- Establish the following radio equipment operating mode:
- before beginning of battle—"listening watch";
 - with beginning of combat operations—unrestricted;
- b. by wire means:
 - in defense area—point-to-point from MRB COP with all elements of the battle formation;
 - c. coordination:
 - with 1st/122nd MRR over radio by mutual entry into battalion commanders' radio nets, and over wire lines via 122nd MRR CP communications center;
 - with 2nd/123rd MRR over radio by mutual entry into battalion commanders' radio nets;

d. by mobile equipment—in accordance with excerpt from operating schedule of regimental military postal and courier service.

3. Distribute signal platoon personnel and equipment as follows:

- BMP-1KSh to 2nd MRB commander;
- BMP-1K to 2nd MRB chief of staff;
- R-159 with radiotelephone operator assigned to each company, to combat outposts, and to the logistic support platoon and battalion aid station;
- R-158—allocate four sets each to 4th, 5th and 6th companies.

Use wire means of communication for setting up the battalion COP communications center telephone exchange and cable lines with all elements of the battle formation.

I assign to the reserve 1 R-159, 1 BMP-1, 2 R-158's, 2 TA-57's and 1 km of P-274M.

I am providing for the following to improve communications stability: run cable through alternate areas of C² facilities along terrain irregularities and communication trenches, and lay it in the ground on exposed sectors.

Issue radio operating data to 6th MRC commander in case he assumes C² of the battalion. In addition, place the communications reserve at his disposal.

Control of communications will be exercised from the 2nd MRB COP. Readiness of communications by 0500 hours 9 May.

In conclusion we will note that it is possible to save considerable time by using the examined variants of work by the chief of communications at different stages of planning communications in the battalion. This means communicators will succeed in preparing better for performing their missions in an upcoming battle.

Improving Effectiveness of Fire

95UM0013G Moscow ARMEYSKIY SBORNIK in Russian No 3, Sep 94 (signed to press 23 Aug 94) pp 38-39

[Article by Colonel Yu. Danilov, candidate of technical sciences]

[FBIS Translated Text] The practice of conducting combat operations in Afghanistan, where around three-fourths of the territory is occupied by mountains and high plateau regions, showed that one of the main problems which troops encountered was organizing motor column security. The majority of mountain roads are very narrow and abound in steep descents, ascents and short-radius turns. They often pass along

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gorges, half-tunnels in their walls, overhangs, galleries and tunnels, on approaches to which the roadway width as a rule decreases. Rivers, all kinds of slides, landslips, falling rocks, snow avalanches and tree blow-downs represent significant obstacles.

The enemy would arrange ambushes with skilled use of terrain relief, deploying his weapons above the roadbed, which allowed him to conduct effective fire. Ambushes on both sides of the road presented the greatest danger.

For motor column security on the route, our troops usually included 2-3 ZU-23-2 anti-aircraft guns and armored vehicles (BTR, BRDM, BMP) in their makeup. Soldiers' personal weapons (assault rifles, machineguns) also were used for this purpose. But experience showed that use of small arms (AKM, AK-74, RPK, RPK-74, PKMS) was not always effective for covering columns. This is dictated above all by the impossibility of conducting aimed fire to great distances, by the low power of ammunition, and by the fact that fire had to be conducted against an enemy reliably sheltered behind rocks. Therefore the ZU-23-2 anti-aircraft gun found wide use. It would be installed in the bodies of trucks with sides. Having high accuracy of fire, a high rate of fire, large laying angles and high mobility, it produced rather good results.

Subunit capabilities in conducting combat operations in the mountains can be higher using more powerful ammunition such as VOG-17 rounds, whose 90 percent casualty radius of grenade fragments is at least 7 m. Direct use of the AGS-17 automatic grenade launcher for this purpose is difficult, above all because of its low maneuverability of fire and small sector of fire (compared with the anti-aircraft gun).

A group of specialists from the Artillery Armament Chair of Tula Higher Military Artillery Engineering School successfully solved this problem. An AGS-17 grenade launcher was mounted on the general-purpose mount of the 6U6 anti-aircraft gun, resulting in an anti-aircraft machinegun/grenade launcher unit (NSV 12.7-mm heavy-caliber machinegun plus AGS-17 30-mm automatic grenade launcher).

Front and rear brackets are welded to the machinegun mount cradle. The cradle from the AGS-17 authorized mount is articulated with the rear brackets and its front part is connected with the front brackets using spring-loaded fixing arms. If necessary, this permits tilting the grenade launcher body backward and gaining direct access to the machinegun receiver and feed assembly. Force on the elevating mechanism handwheel handle is adjusted (in view of an increase in mount weight) by turning equilibrators adjusting screws.

The presence on the mount of the authorized aiming device (OP81 ground optical sight and OP80 anti-aircraft collimator sight) and laying mechanisms providing high laying speed and accuracy in a large range

of angles in combination with small overall weight and the possibility of stripping to individual packs makes the machinegun/grenade launcher mount a maneuverable, mobile weapon and, most important, effective from the standpoint of fire under mountain conditions. That combination permits expanding capabilities of combat employment and makes the weapon more general-purpose.

The mount made by the chair collective showed good results in tests under range conditions.

EQUIPMENT AND ARMAMENT

T-72: Troubleshooting

95UM0013H Moscow ARMEYSKIY SBORNIK in Russian
No 3, Sep 94 (signed to press 23 Aug 94) pp 50-51

[Article by Colonel S. Bogdanov, candidate of technical sciences, docent, and Colonel G. Shcherbakov, candidate of technical sciences, under rubric "Study. Operation"]

[FBIS Translated Text] The power plant is the main source of mechanical energy in armored vehicle armament and equipment. It accounts for a considerable portion of the overall number of failures, both production-technological as well as operational. Servicing and routine maintenance of the tank power plant is done by the driver. The greater his experience, the faster he is capable of determining the reasons for malfunctions from external signs and remedying them. But drivers lack appropriate experience in the first periods of service, which hampers their performance of combat training missions and sometimes even leads to engine and power plant breakdowns.

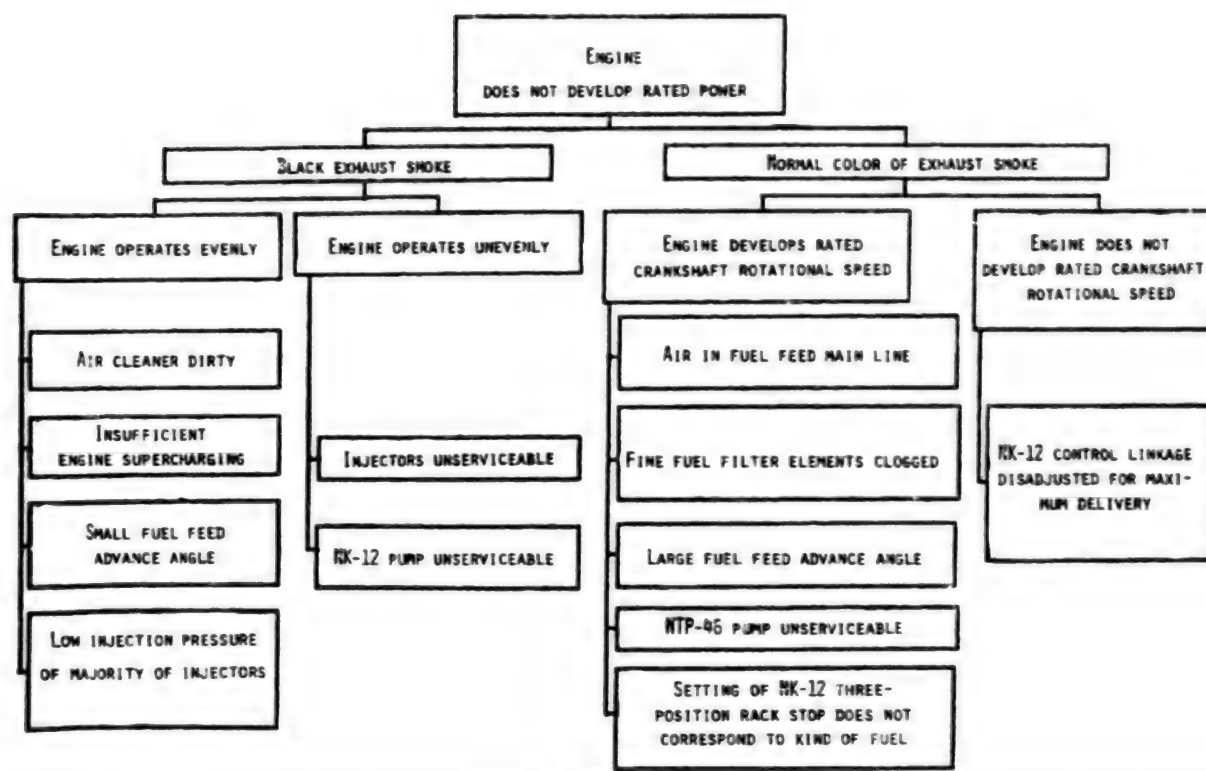
To compensate for shortcomings in power plant operation, the manufacturing plant appends to the tank documentation a technical description and instructions, which provide a list of possible power plant malfunctions and point out probable causes of their appearance and methods of remedying them. An analysis of this extremely small amount of material reveals an insistent need for systemizing and supplementing them. Preferably they should be in the form of a table, which will increase the methodology's effectiveness. It is possible to easily develop troubleshooting algorithms based on the tabular method. The table and algorithms also can be used to intensify the driver training process.

Statistics indicate that the engine accounts for the greatest number of T-72 tank power plant malfunctions. In connection with this, we are presenting as an example a table characterizing relationships between malfunctions in the T-72 tank engine and individual systems as well as power plant and transmission assemblies.

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Malfunction										Cause
Crankshaft is not cranked by starter generator	Engine does not start	Engine stops suddenly	Engine operates unevenly	Engine hiccups	Engine does not develop rated crankshaft rotational speed	Engine does not develop rated power	Engine produces blue smoke	Engine produces black smoke	Engine races	
	+			+		+	+	+		Fuel feed angle of advance set incorrectly
						+	+			Increased piston ring wear
						+				Insufficient engine supercharging (looseness in supercharger-air cleaner connection)
			+							Fuel distributing cock closed
			+							Fuel tanks empty
			+	+	+					Fuel lines or fuel filter elements clogged
			+	+	+					Openings in floating valve body clogged
			+	+	+					Air in fuel feed main line
			+	+						Attachment of high-pressure fuel lines has loosened
			+	+						WTP-1 not turned on or unserviceable (when operating on gasoline)
			+	+						WTP-46 pump unserviceable
					+					WTP-46 seal broken
				+	+	+	+	+		WK-12 pump unserviceable
				+	+					Setting of WK-12 three-position rack (reyka) stop does not correspond to kind of fuel
				+	+					Injectors unserviceable
			+	+						Minimum stable crankshaft rotational speed low
			+	+						WK-12 control linkage disadjusted for maximum delivery
					+					Air cleaner dirty
				+						Low oil and coolant temperature
										Break in oil line or oil cooler
									+	Entry into oil of coolant from cooling system
									+	Insufficient air pressure in air system
									+	Starter generator does not provide sufficient crankshaft rotational speed
									+	Knock of distributing cock on inlet pressure regulator (redaktor) is in IS (not further expanded) position
									+	No oil in hydraulic control and power transmission lubrication system tank
									+	WTP-2 of tow unit is unserviceable

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It should be remembered that the table gives only the general direction for troubleshooting, but it is necessary to apply the algorithmic method for final assurance that the conclusion is correct, i.e., additionally analyze the external signs that more completely characterize the state of the engine at the moment a malfunction is discovered. A sample algorithm for discovering the malfunction "Engine does not develop rated power" is depicted in the diagram.

In our opinion, using the tabular method for determining malfunctions will permit improving the quality of power plant operation, servicing, maintenance and repair, which in the final account will lead to increased combat readiness.

Tank Machineguns

95UM00131 Moscow ARMEYSKIY SBORNIK in Russian No 3, Sep 94 (signed to press 23 Aug 94) pp 52-53

[Article by Captain A. Vorobyev]

[FBIS Translated Text] Additional requirements are placed on the design of machineguns installed inside a combat vehicle because of the limited inner turret volume. Among them are the need to use devices reducing gas contamination of compartments and providing for collection of spent cartridge cases. Inasmuch

as machinegun fire from a tank is conducted with high intensity and there is no opportunity to replace overheating barrels, more massive or special devices are required for cooling them in the process of fire.

Machineguns situated outside the hull or turret have remote control of firing, loading and reloading. Depending on caliber, they are used to engage personnel or repel enemy air raids and combat other lightly armored targets.

Initially conventional infantry models were installed on Russian Army combat vehicles, particularly Model 1910 Maksim heavy machineguns and light machineguns of various foreign makes. But operating experience revealed the need for their modification with consideration of the specific nature of accommodation.

The first Soviet tank machinegun was created based on the Model 1927 Degtyarev infantry machinegun and was designated the DT (Degtyarev tank). Its basic distinction was the presence of a telescoping metal stock. The DT was attached in the tank using a ball mount, providing for rapid laying on a target and fixation in a given position. In case the combat vehicle was damaged, the machinegun was easily removed from the mount and used as an infantry model. It was used widely in Soviet tanks in the Great Patriotic War.

After 1945 the Goryunov-system 7.62-mm tank machinegun (SGMT) became operational with the Armored Troops as a hull machinegun or coaxial with the gun. The coaxial machinegun was installed on medium tanks. It was laid on a target with the help of a scale inscribed on the optical sight graticule. The weapon was fastened at two points on the cradle bracket. The front attachment was cushioned. The electric trigger mechanism supported remote fire control. The machinegun was supplied with a box holder, increasing the reliability of automatic equipment action, and a spent cartridge case bag. Belt tips were

shortened for convenience of loading. The crew was protected against bullet splashes by a special shield.

The hull machinegun was installed in the combat vehicle driving compartment. It had a device for cocking the automatic equipment's moving parts and was supplied with special boxes with a belt feed arm. An extension piece, which facilitated the removal of powder gases outside the driving compartment, was screwed onto the muzzle end of the barrel in place of a flash inhibitor. The machinegun was laid by turning the tank hull.

Specifications and Performance Characteristics of Tank Machineguns

Indicators	SGMT	PKT	NSVT	KPVT
Year operational	1949	1962	1972	1954
Caliber, mm	7.62	7.62	12.7	14.5
Maximum range of aimed fire, m	2,000	2,000	2,000	2,000
Grazing-fire range, m:				
against head-shoulders-chest target (height 50 cm)	420	440	460	521
against running human-figure target (height 150 cm)	640	670	750	840
Range of killing effect of bullet, m	3800	3800	-	-
Maximum range of bullet flight, m	5000	5000	-	-
Cyclic rate, rounds/min	600-700	700-800	700-800	550-600
Rate of fire, rounds/min	250-300	250	210	70-80
Bullet muzzle velocity, m/sec	855	855	845	990
Weight of machinegun minus mount, kg	13.5	10.5	26.8	52.2
Barrel weight, kg	4.1	3.23	-	-
Weight of box with loaded belt, kg:				
for 50 cartridges	-	-	11.1	12.3
for 250 cartridges	9.4	9.4	-	-
Machinegun length, mm	1140	1098	1610	2000
Cartridge weight, g	21.8	21.8	123-137	200
Bullet weight, g	9.6	9.6	44.3-49.5	60-63.5

The Kalashnikov-system tank machinegun (PKT) became operational in 1962 in connection with standardization of small arms. Compared with the infantry version, it had a number of features in the arrangement of mechanisms and parts. Barrel length is 722 mm. The muzzle velocity of a steel-core bullet is 865 m/sec. Compared with the PK barrel, the barrel is heavier by 1.2 kg, which permits conducting more intensive fire. A piston guide tube spring has been introduced to reduce the barrel's receiver play and to preserve the very same grouping as for the SGMT. The gas regulator is made according to the principle of a changing cross-section of the gas escape pipe. The PKT is aimed with the help of the gun optical sight. The machinegun has no stock. The receiver is attached to the cradle bracket just as for the SGMT. An electric trigger

fastened on the receiver butt plate has been introduced to the design for remote control of fire. Stoppages during fire that are difficult to remedy and which occur because of the case separating and the bullet falling out of it (breaking into component parts) are not inherent to this weapon. The PKT operates reliably under dusty conditions. It is partially stripped without removal from the mount.

Heavy-caliber machineguns also have found wide use in the armament system of tank troops. They basically are installed outside armored equipment (BTR, BMP, tanks). The Nikitin, Sokolov and Volkov system 12.7-mm heavy-caliber tank machinegun (NSVT) has given a good account of itself. Its design uses both an electric as well as mechanical trigger.

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The Vladimirov-system 14.5-mm machinegun (KPVT) is a powerful means of engaging enemy personnel and antitank weapons. It has certain design features compared with the infantry version. In particular, an electric trigger and pulse round counter serve for remote control. Spent cartridge cases are ejected forward and deflected outside the turret by a cartridge case deflector. The jacket diameter has been increased, which permits replacing the barrel without unscrewing the piston. The machinegun is laid with the help of an optical sight.

Modernized Workshop Set

95UM0013J Moscow ARMEYSKIY SBORNIK in Russian
No 3, Sep 94 (signed to press 23 Aug 94) pp 54-56

[Article by Colonel V. Boychuk, Colonel V. Sharafutdinov and Colonel (Reserve) I. Shaymardanov]

[FBIS Translated Text] To perform medium repairs on fuel service equipment as well as major overhaul of its assembly units under field conditions, a supplementary modernized set (DKM-PRM SG) is used together with a fitter's repair shop (MRS), machine repair shop (MRM) and welding shop (MS-A). It consists of two fuel service shops: for equipment repair (MRTS SG) and for welding (MS SG).

The fuel service equipment repair shop is intended for performing disassembly-assembly, fitting, vulcanizing, testing and other work in repairing fuel service equipment. Its production equipment is accommodated in portable boxes of prefabricated benches transported in the body of the KamAZ-4310 vehicle. The latter is used for transporting cargoes after the repair equipment is unloaded.

General-purpose equipment and tools are accommodated in Bench No 1. There are tool sets Nos 1, 2, 3 and 4 for performing fitter's work and Nos 7, 8 and 9 for special work. Meters and manometers are repaired and checked using tool set No 6. Bench No 2 contains devices and tools for repairing various kinds of valves [klapany, zadvizhki, ventili]. M14 micropowder and 10 GOST 3647-80 polishing powder are used as abrasive material for grinding valves. In addition, the set has the MRSO.19.150 tap wrench and a lapping plate.

Equipment for repairing pumps is stored in benches Nos 3 and 4. It includes devices for disassembling pumps and boring their bodies, mandrels and clamps for pressing bearings out (or in), lip-type seals and face [tortsevyi] seal parts, and a set of strippers and special wrenches. A test bench for checking pumps is provided in the fuel service equipment repair shop. It consists of the ZMZ-24-01 engine, gearbox, movable work table, a set of adapters for connecting pressure and suction lines, and the GN-60 hydraulic pump. On the bench it is possible to pressure-test, break in and check the

working capacity of VN 8/5, ZV8/25-8/5, ShV-25-5.8/2.5-1, Sh-40-6, RZ-30, STsL-20-24 A and V, SVN-80 and SVN-80A, STsN-60M, and STsN-20-40 pumps.

Soft (rubber-fabric) tanks are repaired using special equipment, which includes the following: polishing machine, electric hot plate with thermoregulator, set of screw clamps, rollers [prikatochnyye roliki] and other tools. Cracks and holes in body parts are fixed using epoxy adhesive compounds. For this purpose the workshop has the AR-1 repair kit, which is equipped with ED-20 epoxy resin, polyethylene polyamine (PEPA) and dibutyl phthalate. Aluminum powder or iron powder is used as a filler. The epoxy mixture is prepared without first weighing components because of their dosed packaging. The AR-1 has auxiliary materials—water glass, cellophane, gauze, acid paste mixture, cement, acetone, glass cloth and aluminum plates.

A dead-weight pressure-gauge tester is in a special box in the vehicle body, and a set of tools and expendables are in Bench No 5; they are used for repairing and checking pressure devices. Equipment for straightening containers consists of a jack, two supports, two levers, three lengtheners, and cross pieces. The set is contained in the right rear corner of the vehicle bed. The RTS SG fuel service equipment repair shop is outfitted with auxiliary equipment (12x10 m tent, heating unit, compressor, connector cables, DK-5 decontamination set, and entrenching tool).

The MS SG fuel service welding shop is intended for welding work when repairing fuel service equipment. Production equipment accommodated in the KP-4 van mounted on the SMZ-782B chassis permits welding parts made of aluminum and its alloys and also cutting aluminum and ferrous metal articles. For these purposes the shop has the UDG-501U1 welding unit, UPRP-201U3 air-plasma cutting unit, SO-7B mobile compressor, and a pump unit with a tank for water used for cooling. In addition, a set of power hand tools (electric drill, pneumatic polishing machine, soldering lamp, files, marking tool and set of bench tools) is used to prepare the edges of parts to be welded. In a traveling configuration all equipment is stowed and secured in places especially set aside for it.

Welding shop electrical equipment consists of electric appliances installed in the van (power panel, socket unit, plugs, terminal blocks), using equipment, and panels with a safety disconnect device.

A mobile 400 volt, three-phase current generator or an industrial 380 volt, three-phase current power network can be used as a power source. There are electrical junction cables, attenuators and a power panel for connecting the shop to an external power network and to equipment. The shop is grounded by pins interconnected by a cable.

A 30x60 m level sector is selected for setting up the shops. Ten stations are accommodated in the MRTS SG fuel service equipment repair shop production tent and seven are placed on the ground.

MILITARY SCHOOL: DEVELOPMENT AND PROSPECTS

Who Will Enter the Schools Tomorrow?

95UM0013K Moscow ARMEYSKIY SBORNIK in Russian
No 3, Sep 94 (signed to press 23 Aug 94) pp 57-59

[Article by Lieutenant Colonel V. Vladimirov, candidate of sociological sciences]

[FBIS Translated Text] Recruitment of military school candidates is becoming one of the most acute problems of the higher school today. Moreover, the question arises about how to compete with other educational institutions, especially those guaranteeing prestigious, high-paying professions as managers, businessmen, bank employees and so on. This means in order for military higher educational institutions to survive, new approaches are needed not only to organizing the training process, but also to seeking ways which would permit elevating the status of the Army and of military service as a whole (and consequently also of military educational institutions) to a worthy height in public awareness. And one cannot get by here without basic research, the results of which would help develop a scientifically substantiated state program for saving Russia's higher military school.

It must be said that certain steps are being taken in this direction. On instructions of the Russian Federation Ministry of Defense Main Directorate of Military Educational Institutions, the Russian Federation Armed Forces Center for Military-Sociological, Psychological and Legal Research performed certain work to study problems of military educational institutions and prospects for development of military education. Last year sociologists surveyed 349 instructors, 376 cadets and 145 students of a number of military schools and academies.

This article will discuss results and conclusions only of one study conducted at Rostov Higher Military Command Engineering School of Missile Troops, but problems characteristic of all military educational institutions are reflected here as in a drop of water.

The sociologists' task was to determine strong and weak points of the presently existing military cadres training system. To the question of how they evaluate the existing officer cadres training system, 35 percent of cadets and 58 percent of instructors responded that it does not conform or more does not conform [than it conforms] (39 and 17 percent) to the level of modern demands.

Meanwhile, Rostov cadets assess the training system in their own school more positively than do their colleagues in other military educational institutions. At the same time, over half (58 percent) of instructors surveyed believe that the training level of school graduates conforms to demands placed on them in the troops or it more conforms than does not conform. Forty percent of cadets agree with this opinion, but a fifth of them did not respond to this question.

So in the opinion of cadets and instructors, what is lacking in the professional training of school graduates? Priorities were distributed as follows: 65 percent of cadets and 44 percent of instructors believe that practical skills of working with weapons and equipment are lacking. Thirty-nine percent of cadets and 50 percent of instructors are convinced there is a lack of ability to work with people.

There is also a lack of overall erudition (35 and 54 percent respectively), of psychological readiness for service (29 and 40 percent), of knowledge in the military area (29 and 23 percent) and of physical conditioning (14 and 2 percent). Some respondents think there is a lack of overall culture, independence and moral and mental stability. Others asserted that insufficient attention to combat training is the cause of graduates' unsatisfactory professional training.

Those surveyed assess in different ways the work of particular school structures in organizing and directing the training and education process. For example, cadets have the most positive attitude toward the activity of professors, instructors and the command element. They are more negative in assessing the activity of entities for educational work and rear services. Responses were distributed as follows to the question "Are you satisfied with the activity of school structures in organizing and directing the training and education process?"

Six percent of instructors and 14 percent of cadets are satisfied with the work of the command element, and 31 and 40 percent of those surveyed respectively are dissatisfied. Two percent of instructors and 2 percent of cadets had difficulty responding. Fifteen percent of pedagogues and 34 percent of cadets are satisfied with the activity of professors and instructors and 0 and 3 percent of respondents respectively are dissatisfied. No instructors and only 6 percent of cadets were found who were satisfied with the work of educational structures. On the other hand, 44 and 49 percent of respondents respectively were dissatisfied. Of those surveyed, 19 and 10 percent respectively had difficulty responding.

The opinion was even worse about work of logistic support entities. Here 0 percent of instructors and 2 percent of cadets turned out to be satisfied and 73 and

45 percent respectively were dissatisfied. Fifteen percent of instructors and 14 percent of cadets had difficulty answering.

Thus it is quite obvious that a need has matured to engage seriously in improving the entire cadet training and education system. To put it more simply, it has to meet the level of modern requirements, and this means that special attention in training future officers must be given to instilling practical skills in working with weapons and equipment, to broadening their horizons, and to acquiring experience of contact with people. And of course, instilling a mental readiness for troop service must become a subject of special concern. Only in that way is it possible to elevate the military school's prestige.

But how can what has been said be put into practice? What must be done for this? Those questions were asked of all participants of the sociological study. The responses were distributed as follows: 66 percent of cadets and 25 percent of instructors are convinced that the practical direction of training must be strengthened; 61 and 31 percent of respondents respectively think that introducing the most modern training methods and forms to the training process is one of the priority tasks; and 50 percent of cadets and 81 percent of instructors favored improving the quality of cadet selection for military educational institutions.

The time has come to update training facilities of military higher educational institutions—this was pointed out by 44 percent of cadets and 50 percent of instructors. Thirty-nine percent of future officers and 8 percent of their mentors think that giving consideration to cadets' opinions in evaluating an instructor's work will help improve the training of specialists for the troops.

There definitely should be an increased number of hours set aside for study of technical disciplines (36 and 29 percent of respondents respectively) and a revision in curricula and training programs (28 and 19 percent respectively). Thirteen percent of cadets and 8 percent of instructors deem it necessary to set aside more time for the study of disciplines in the humanities.

Increasing the exactingness toward trainees is seen by 13 percent of cadets and 15 percent of instructors as one way of achieving effectiveness in training future lieutenants. Ten and 58 percent of respondents respectively favored reducing the instructor load. An opinion also was expressed about the need for chair heads to increase exactingness toward pedagogues.

A significant portion of instructors speak out not only for elevating the fundamental nature of education, but also for introducing a multilevel system of military education, and for developing secondary military education in particular. The respondents believe that

cadets who cannot master the higher educational institution program to the full extent can be graduated as technicians after just two years.

Study organizers also asked future officers the following question in the course of the sociological study, taking into account that a reduction in Army numerical strength is occurring today: "What do you think about your further service prospects and will you find a job for yourself to your liking should you be discharged suddenly to the reserve?" The answers indicate that every other cadet links further prospects with military service, but 40 percent of study participants were at a loss as to how to respond to this question. Among instructors, 12 percent plan to be discharged from the Army, 69 percent intend to serve further and 17 percent of pedagogues have not decided what they would do.

It must be said that one reason that forces servicemen to link their lives with the Army is the guarantee of receiving certain material benefits: an apartment, social benefits, and pay that ensures a comfortable existence. The majority of those surveyed pointed this out. But those who are being discharged or who are vacillating believe that the profession of officer is unpopular above all because he has low pay for present times that does not permit providing a fitting existence either for the serviceman himself or for members of his family. And it is more advisable to try to test one's strength in the business sphere while one is healthy.

Only 4 percent of cadets are skeptical of their chances of finding decent work in civilian life after completing school, 18 percent of respondents are sure they will find a job to their liking there as well, and 15 percent of those surveyed experienced difficulty in answering. A third of survey participants wrote "more yes than no."

In answering the question whether or not he would be able to find decent work in civilian life, one school professor responded: "Today I will be able to, but tomorrow, no!" Alas, in fact professionals will be required in the business sphere tomorrow not simply with experience, but with a specialized education. Will a military diploma prove useful to the officer then?

I believe this question is far from rhetorical, since today not only the fate of former professional servicemen, but also the future of the military school depends on the answer to it. In other words, will the best, most intellectual youth of Russia wish to go study in military schools or not? In order for them to do so, it is necessary to create the necessary preconditions already now. And this means not only an attractive image of study in a military educational institution and high organization of study and service, but also confidence in tomorrow, even if it will be necessary to change one's kind of work tomorrow.

SCIENCE. TECHNOLOGY. PROGRESS

We Are Known Throughout the World

95UM0013L Moscow ARMEYSKIY SBORNIK in Russian
No 3, Sep 94 (signed to press 23 Aug 94) pp 62-65

[Interview with Yuriy Aleksandrovich Kuznetsov, candidate of technical sciences, Lenin Prize laureate, chief designer of acquisition radars in S-300 SAM systems, by Colonel V. Migunov, occasion, date and place not specified; photograph of Kuznetsov included]

[FBIS Translated Text] *From his biography.*

Yuriy Aleksandrovich Kuznetsov was born in Krasnoyarsk Kray in 1935. He completed the radio engineering faculty of Tomsk Polytechnical Institute. He was chief of a laboratory and a department, director of a scientific research institute, and general director of a scientific production association. From 1987 he was general designer of ground acquisition radars. He presently is chief designer of acquisition radars which are part of various modifications of S-300 SAM systems.

Candidate of technical sciences. Lenin Prize laureate. Decorated with two orders of Labor Red Banner and with medals.

[Migunov] Yuriy Aleksandrovich, for the first time in many years domestic radar equipment, including for military purposes, has been shown openly to the world at international exhibitions IDEX-93 in Abu-Dhabi, LIMA-93 in Malaysia and FIDAE-94 in Chile. Of course, we sold our equipment abroad even earlier, but at these exhibitions our developers and manufacturers were able to become familiar for themselves with the level of world radar development. What firms presented their products at the exhibitions?

[Kuznetsov] The one in Abu-Dhabi was the most representative. The majority of countries and firms which, according to our information, engage in the development of ground acquisition radars, took part in it: General Electric and Westinghouse (USA), Alenia (Italy), Marconi (UK), Siemens (Germany), and firms of the Republic of South Africa and China. Unfortunately, the Japanese and French did not demonstrate their radars.

[Migunov] What is the level of world radar development today and what are the trends in using wavebands and in using kinds of antenna devices, computer equipment and so on?

[Kuznetsov] Wavebands being used remain the traditional ones—SHF and UHF. As a rule, radars for acquiring low-flying targets determine range and azimuth but not altitude, i.e., they are two-dimensional. Medium and high altitude radars are three-dimensional. In scanning space, mechanical rotation of the antenna is combined with electronic beam forming,

and both traditional reflector arrays as well as phased arrays are used. As a rule, signal processing is digital and target acquisition and coordinate measurement are automatic; adaptation to the interference environment also is automated. The radars have a monitoring capability and simulators capable of simulating the air situation, and all this using computer equipment. There is a noticeable attempt to increase equipment mobility—to reduce the time for tearing down and setting up. The directions of development here and abroad basically coincide.

[Migunov] It must be assumed that you received exhaustive information at the exhibitions. That means the West really is open to us and not keeping secrets?

[Kuznetsov] This is far from so. Yes, we received brochures or information leaflets on almost all foreign radars, but it is difficult to obtain information that goes beyond that. For example, in Abu-Dhabi Marconi representatives both avoided answers and did not give out brochures; they partially improved at LIMA-93.

Of course, we often inquired as to engineering and design-technological solutions, something which firms were not interested in imparting. But we also did not receive answers to questions about purely consumer characteristics. The Republic of South Africa was the exception—we received answers to all questions not touching on know-how.

[Migunov] What did our country demonstrate at the exhibitions and how do we appear against the background of foreign models?

[Kuznetsov] There essentially were no analogues for any of our radars. The Nebo and Nebo-SV VHF-band radars attracted visitors' attention for the fact that they are capable of acquiring targets created with Stealth technology (so-called "invisible" targets), they have little sensitivity to weather formations, and they possess an increased capability to acquire precision weapons. The radars themselves are protected against missiles homing on radio emissions—they simply do not exist in the VHF band and their creation is problematical.

Original antenna designs ensure precise determination of coordinates and an acceptable tear-down and set-up time, despite the considerable dimensions necessary in this band.

The Kasta-2Ye1 and Kasta-2Ye2 low-flying target acquisition radars differ fundamentally from foreign radars by the capability to raise the antenna on a special 50-meter tower, by fewer signal path losses and by better quality of target indication, and they have a longer effective range. And the Kasta-2Ye2 also has the capability of determining target altitude (flight level).

Autonomous target acquisition radars in the makeup of the Buk-M1 SAM system and the S-300P and

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S-300V systems also did not look bad against the general background. Above all this is because surveillance acquisition radars are not used in foreign SAM systems of similar caliber, i.e., the SAM systems are

incapable of operating autonomously, but only by receiving target designations from radar-field equipment—in our opinion, from radiotechnical subunits.

Specifications and Performance Characteristics of S-300V SAM System

Maximum target engagement range, km	100
Target engagement altitude, km:	
minimum (aerodynamic/ballistic)	0.025/20
maximum (aerodynamic/ballistic)	30/25
Target engagement speed, m/sec	0-3,000
Number of targets fired on simultaneously	24
Defended area of system, m ² :	
against simultaneous strike of four Lance missiles	500
against simultaneous strike of two Pershing-1A operational-tactical ballistic missiles	240
against one strike of Pershing-1B operational-tactical ballistic missiles	310
Number of missiles guided simultaneously	48
Rate of fire, sec	1.5
Missile launch preparation time, sec	15
Set-up (tear-down) time, min	5
Time to transfer system from alert to combat mode, sec	40

Our radars installed on a tracked or wheeled chassis of one transportation unit are mobile, have high off-road capability, and have a large zone of coverage in elevation.

[Migunov] Everything that has been said unquestionably is pleasing. But a reader may get the impression that we are ahead of the entire planet in radar.

[Kuznetsov] Better characteristics of computer equipment and of the element base in radars of other countries also permit achieving higher indicators in equipment dimensions, reliability and power consumption, and in a number of instances they have a better design and greater comfort.

[Migunov] How can we take advantage of their experience?

[Kuznetsov] Their element base can be used in our radars. International cooperation in development and in production of computer equipment is a normal phenomenon.

[Migunov] Who was closely interested in Russia's exposition and in what way?

[Kuznetsov] Specialists of manufacturing firms, army and police officers, representatives of agencies and commercial firms, and the press from various regions of the world. High interest was shown, especially in Abu-Dhabi. Visitors took the entire reserve of information leaflets—200-250 for each radar. Some took a long time in studying the materials and had positive comments.

[Migunov] Did they often inquire about price? A contradictory opinion exists that Russia sells military equipment at prices considerably below world prices.

[Kuznetsov] Questions about price were asked rarely. It is my conviction that we have powerful leverage in this regard. Even if our radars are sold at prices 40-50 percent below foreign analogues, even in this case we can have rather good profits because of the relatively low remuneration for labor in Russia. Competitiveness is determined not just by quality (although we have it as well), but also by price—according to the effectiveness/self-sufficiency criterion. Therefore the equipment can be fully competitive. In the not-too-distant past Japan made its way into the world market chiefly because of the lowest prices in the world. We now have a similar situation with radar equipment.

[Migunov] In order to trade successfully it is necessary to have the appropriate system and experience. Did you accumulate it in the far-off countries?

[Kuznetsov] I believe we have to show our equipment abroad and advertise it more, since people do not have sufficient knowledge of it everywhere. It is also advisable to have an exhibition on Russian territory which the country's guests could visit. Whether it is unified or scattered throughout sectoral chief directorates and whether it is permanently multisectoral or with periodically changing exhibits already is the second question. It would not be superfluous to have exhibits in constant readiness which could be sent to any international exhibition. It is desirable to accompany each

presentation of military equipment that is opened for sale with its range demonstration and an invitation to interested persons from other countries.

[Migunov] It is clear from international arms trade practice that matters are not limited to sales. In purchasing that same radar, the purchaser ties himself with the manufacturing country for a long time.

[Kuznetsov] In selling equipment we too must offer services and joint maintenance. Developing countries are especially interested in this, but specialists from states with a high standard of living are unwilling to travel there. This will increase the competitiveness of our products.

A proposal for joint production of equipment being sold can become a deciding point for a country interested in developing its own defense industry, especially if the level of population employment there is low.

Our country's pledge to upgrade the equipment sold—for additional payment, of course—also can be attractive for a customer.

[Migunov] Could Oboroneksport (its functions now have shifted to Rosvooruzheniye), which represented Russia at exhibitions, propose all this? And are not the creators of equipment—the developers and manufacturers—being left out?

[Kuznetsov] They have to play the prevailing role in the arms trade. Of course, not all of them have sufficient experience in commerce today. Joint work with organizations specializing in the arms trade is necessary. The latter often exaggerate their capabilities and attempt to make deals independently without consulting developers and manufacturers. They work according to the principle of "sell and forget." Unqualified decisions can do harm. What can be sold to whom and how much can be sold must be decided by the Ministry of Defense and Ministry of Foreign Affairs; leave the rest within the competence of industry.

[Migunov] Attempts have been made more than once to get away from the monopoly of one department (Ministry of Foreign Economic Relations) in the foreign arms trade...

[Kuznetsov] The state monopoly in this area should have been accomplished by issuing licenses and establishing quotas, and on this condition industry enterprises should have been permitted to trade directly. And leave for them the right to use an agent. That is the trade procedure throughout the world.

[Migunov] There evidently also are traditions and rules in the world for arranging exhibits. How did we, who generally are novices, look there?

[Kuznetsov] The design of a pavilion and advertising of course are essential. The absence of models of certain systems, the poor quality of plotting boards, brochures and information leaflets, and insufficient information did not dispose visitors to stay at our exhibition longer. Russia was represented only on one page in the main catalogue of the Abu-Dhabi exhibition. Layouts of pavilions and annotations for each booth with an indication of addresses of firms were given for other countries. There was a subject index at the end of the catalogue by which visitors could find booths of interest to them for all firms and countries except... Russia.

The majority of foreign firms began to publish materials on arms to be presented 4-5 months before the exhibition. But we engaged in advertising extremely little and also did not make advance preparation for meetings with representatives of other firms for closer coordination...

[Migunov] And still, Yuriy Aleksandrovich, despite organizational deficiencies, our products had a suitable look and you evidently concluded contracts for deliveries of radars.

[Kuznetsov] These were the first exhibitions in which we took part. In addition, preliminary talks were not held and so we did not expect quick results. But the interest shown in our equipment and its competitiveness permit expecting offers already in the near future.

[Migunov] In selling equipment abroad, do you not risk leaving our Army without radars?

[Kuznetsov] Due to a shortage of funds the Ministry of Defense is forced to reduce purchases of our products substantially. Funds allocated during 1992-1993 were considerably less even for RDT&E. Foreign sales help preserve the potential of industry, and this is the base of defense capability.

APS Underwater Assault Rifle

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[Article by V. Simonov, leading designer, State Prize laureate]

[FBIS Translated Text] It is intended for arming frogmen (supports conduct of aimed automatic fire from any positions under water), equipping underwater movement vehicles, and can be used for self-defense on land. The principle of its action is based on using the energy of powder gases discharged from the main bore (diameter 5.66 +/- 0.5 mm) and acting on a piston attached in the bolt carrier. The trigger mechanism with rear sear is made in the form of a separate assembly attached in the receiver by the selector/safety.

When a round is fired, the bolt opens the bore as it moves backward, extracts the cartridge case from the chamber and ejects it outside. The bolt carrier compresses the recoil spring, displaces the interrupter [otsekatel] backward and fully cocks the trigger mechanism. When the trigger is squeezed, it moves forward under the effect of the recoil

spring assembly. The bolt chambers the next cartridge from the magazine and closes the bore. The bolt is locked by rotating to the right, when its locking lugs go behind the receiver lugs. The bolt carrier continues moving forward and acts on the firing pin, the striking end of which pricks the primer and the round is fired.

Specifications and Performance Characteristics

Caliber, mm	5.66
Lethal range, m:	
at 5 m depth	30
at 20 m depth	20
at 40 m depth	11
Weight of assault rifle, kg:	
with magazine	2.7
without magazine	2.4
Weight of loaded assault rifle, kg	3.4
Dimensions, mm:	
length	614
height	187
width	65
Magazine capacity, cartridges	26
Cartridge weight, g	26
Cartridge length, mm	150

The MPS 5.66-mm cartridge with a long bullet representing a steel rod is used for firing. Its ogive ends in a plateau. When it moves under water, the bullet is stabilized by formation of a cavitation bubble around it. At maximum ranges of fire in the water, the APS assault rifle supports engagement of a swimmer dressed in a wetsuit with foam rubber insulation, and also penetrates plexiglas 5 mm thick. The bullet does not stabilize in the air.

The assault rifle can be fired in short (3-5 rounds) and long (10 rounds) bursts or single shots. Cartridges are fed from a box magazine with a capacity of 26 cartridges. They are kept from tipping upward by spring-action claws. Cartridges are separated by a plate, which precludes bullets from crisscrossing at the moment they are raised up and moved onto the chambering line. For handling convenience, the assault rifle is supplied with a stock that telescopes into the body. It consists of two braces made of steel rod.

Comanche Reconnaissance-Attack Helicopter

95UM0013N Moscow ARMEYSKIY SBORNIK
in Russian No 3, Sep 94 (signed to press 23 Aug 94) p 85

[Article by Colonel (Retired) A. Tarnovskiy]

[FBIS Translated Text] Since April 1991 the U.S. firms of Boeing and Sikorsky have been working to create the RAH-66 Comanche reconnaissance/attack helicopter. It is to replace AH-1, OH-6 and OH-58 helicopters and, together with the AH-64 Apache, provide for quality upgrading of the fleet of Army aviation combat and reconnaissance helicopters.

The helicopter is being developed with the usual configuration, with the tail rotor in a shroud. The air frame design envisages wide use of composite materials, which will permit creating a light machine with good performance characteristics and small radar cross-section. There is a crew of two accommodated in a tandem cockpit.

Weapon employment is supported by a system of sighting equipment consisting of a second-generation IR set, low light level television camera and laser rangefinder-target designator. The electronic equipment system will permit employing the helicopter for visual reconnaissance. In the

future it is proposed to install an EHF-band radar with its antenna placed above the main rotor hub. It will substantially expand the helicopter's capabilities of acquiring targets and will support use of a variant of the Hellfire ATGM with radar guidance.

Main Performance Characteristics:

Maximum flight speed at altitude of 1,200 m, km/hr	330
Vertical rate of climb, m/sec	6
Ferry range, km	2,340
Endurance with fuel reserve in internal tanks, hrs	2.5
Maximum take-off weight (when ferrying), kg	7,790
Dimensions:	
main rotor diameter, m	11.9
length with main rotor turning, m	14.48
Power plant	Two T800-LHT-800 turboshaft engines with maximum output of 1,000 kw each
Armament:	
gun	Two-barrel 20-mm cannon with rate of fire of 1,500 and 750 rounds/min (when firing against air-borne and ground targets respectively) in undernose turret
missile	6 Hellfire ATGM's or 12 Stinger air-to-air guided missiles are in a uniform armament variant on internal suspension (in the fuselage)
mixed version	70-mm free-flight rocket launchers (4 rockets in each). Suspension of up to 8 Hellfire ATGM's or up to 16 Stinger guided missiles or free-flight rocket launchers is possible on external pylons

Series production is planned to begin in 1999. It is proposed to build 1,292 machines. It is expected that the RAH-66 will meet requirements for employment of Army aviation in an air-land operation.

Infantry Weapons: Development Prospects

95UM00130 Moscow ARMEYSKIY SBORNIK in Russian No 3, Sep 94 (signed to press 23 Aug 94) pp 88-91

[Article by Lieutenant Colonel (Reserve) L. Andryushin, candidate of technical sciences]

[FBIS Translated Text] An analysis of RDT&E conducted abroad in the area of infantry weapons shows that their specifications and performance characteristics are being improved basically through an improvement in ammunition. Models of individual and crew-served weapons of new calibers also are being created, but this requires considerable material costs.

Three kinds of weapons are the basis of the system of infantry combat weapons of armies of essentially all world countries: individual automatic weapons with ballistic impulse of 0.2-0.8 kg(f) for 4.7-mm to 7.62-mm cartridges; weapons for support of subunits with ballistic impulse of 1.2-1.3 kg(f) for 7.62-mm to 7.92-mm cartridges; and weapons of mechanized and infantry units and subunits with ballistic impulse of 6-10 kg(f) or more for 12.7-mm to 15-mm cartridges.

All three kinds of weapons are intended for engaging personnel and military unarmored and lightly armored vehicles at ranges up to 2,000 m.

After studying the experience of combat small arms employment, U.S. military specialists concluded in the late 1950's that the average range of effective fire of individual weapons (automatic rifles) does not exceed 300-400 m; in engaging the enemy a lethal outcome is most likely if a round is fired from a range of no more than 100 m; and that lethality of 7.62-mm ammunition is relatively low and the 7.62-mm rifle system is heavy and cumbersome. At the same time, the 7.62-mm cartridge is too powerful for automatic rifles.

All this served as the reason for creating a radically new small arms concept. The following requirements made up its basic content: the length of each burst of rounds must be sufficient for at least one bullet to hit a head figure target at a range of around 450 m; the burst shot pattern must compensate for aiming errors; the two walls of the U.S. steel helmet and protective elements must be penetrated at a range up to 450 m. One other condition was added somewhat later: the weight of the rifle (no more than 2.8 kg) and 200 cartridges must not exceed 10 kg. The result of realization of the enumerated requirements was the manufacture of 4.7-mm to 5.6-mm small-caliber, high velocity ammunition and acceptance into the U.S. Army inventory of the M16 5.56-mm assault rifle for the M193 cartridge.

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In 1980 the low-recoil M109 5.56-mm cartridge with the case from the M193 cartridge was standardized, after which it was adopted as the second small arms ammunition for NATO countries and for other armies of western states. At the same time, similar 5.45-mm small arms ammunition came into the inventory of armies of Warsaw Pact countries.

The lethality of the light (3-4 g), small-caliber bullet comes from an increase in its velocity at the target to 800-1,000 m/sec. In addition, the distance between its center of gravity and center of pressure is sufficiently large, which together with high velocity dictates a loss of stability when penetrating human bone and muscle tissues (the bullet may swivel sideways in movement).

A variant of the M109 5.56-mm cartridge with composite core (steel insert and lead sabot) was created for effective action against armored targets. Its bullets have greater length and less turn: it is 305 mm for the M193 and 178 mm for the M109.

It is reported that the United States is working especially within the scope of the ACR program to create not only an individual automatic weapon, but also a light support weapon for small subunits for the low-recoil 5.56-mm cartridge—a light machinegun with a range of effective fire of 800 m. Several assault rifle models have been developed under this same program. One, the AA-1, resembles the M16A1 rifle in external appearance. Its main innovation is that it fires flechettes weighing 0.66 g, with a diameter of 1.5 mm and a length of 41 mm. The flechette has tail fins and is sharpened at the tip. Its attachment in the case and the obturation of powder gases when moving along the bore is accomplished by four plastic segments connected by a ring with the subcaliber projectile.

When the bullet leaves the barrel, sabot segments separate under the effect of air resistance and it flies further with less drag than usual. Therefore velocity is reduced insignificantly: with a muzzle velocity of 1,402 m/sec, it is 1,219 m/sec at a distance of 350 m. Rather good accuracy is preserved at a range up to 1,000 m. The flechette is mounted in the standard NATO M855 5.56-mm cartridge case.

Reliable operation of the automatic action when firing low-recoil cartridges with light flechette bullets has been provided by shifting the gas port opening on the rifle toward the breech end of the barrel. Because the cartridge configuration had changed, it was necessary to modernize the magazine well and develop a new magazine made of high-strength plastic.

Another model, proposed by Colt, is a technically improved version of the M16A2 rifle. Its stock is telescoping and has six positions, which provides convenience in firing. The pistol grip and handguard have been improved and the front sight has been made white for more rapid orientation in aiming. A new

muzzle brake is used, consisting of concentric tubes placed around the barrel, and a hydraulic oil shock absorber has been used in the rifle butt. Because of this, weapon recoil was reduced 40 percent compared with the M16A2. The Colt rifle can fire any standard 5.56-mm ammunition loaded in conventional magazines.

It has been reported that the firms of Colt and Olin together have developed a duplex ammunition: two bullets are loaded one after the other (the first 2.26 g and the second 2.13 g) into a standard M855 cartridge case. It is believed that using such a cartridge will increase target kill probability at a range up to 325 m. This effect will be achieved from the fact that the first bullet flies to the point of aim and the second with a small random deviation from it, thereby compensating for a rifleman's aiming error. The duplex ammunition is colored yellow to distinguish it from standard ammunition.

German designers are working in parallel with U.S. specialists to create small-caliber weapons. In particular, the firm of Heckler und Koch has proposed a rifle model which is a modernized version of the widespread G11. The new weapon's operating principle is based on the chamber's radial, reciprocating movement. In the loading position the chamber is positioned vertically and the feed lever draws the cartridge directly into the chamber (bullet first). Then the chamber rotates 90° and takes up a horizontal position for firing, and returns to the initial position after the round is fired. The entire process occurs in an automatic mode at a rate of 450 cycles per minute with semiautomatic fire and 2,000 cycles per minute with automatic fire.

It is also reported that work to create caseless ammunition continues. Its design principle is as follows: a 4.7-mm bullet is fully enclosed in the body of the propellant charge and held by a plastic tip. Behind it is a copper cap with an accelerating mixture, the open end of which faces the detonator. The accelerator forces the bullet into the rifling of the barrel and quickly closes the front part of the chamber against the escape of powder gases. Remnants of lead caps and plastic tips are ejected from the barrel during firing.

Foreign specialists note that spontaneous ignition of a cartridge from an overheated weapon barrel is a traditional technological barrier in creating caseless ammunition. Heckler und Koch succeeded in overcoming it partially. It is reported that it is possible to fire a minimum of 112 continuous rounds from rifles if it is manufacturing before probable self-ignition. The weapon body is made of plastic and is fully sealed, which precludes foreign bodies getting into the mechanism. There is a control valve for the escape of gases. A muzzle brake or muzzle compensator is not required. Recoil force is decreased through use of a

shock-absorbing mechanism which "floats" on an internal rail, and the length of its travel depends on the method of fire.

The rifle of the Steyr-Mannlicher firm is intended for firing flechettes contained in plastic cases around 10 mm in diameter and 46 mm long. The case is fitted with a formed cap for the percussion cap, which is an aluminum ring with a groove filled with a special mixture. The flechette is 1.5 mm in diameter and 41 mm long. Four plastic sabot segments are attached to it before it is placed in the case. Ignition is accomplished at the side of the case. A rising chamber moves upon a fixed firing pin through a special opening. The gas system is simplified: the barrel is used as a stationary plunger and the sleeve around it acts as a moving cylinder wall. The bolt carrier is connected directly with the sleeve.

All four rifle models examined have a modular design. The weight of their ammunition is equal to or less than that of the standard NATO M855 cartridge. They are fitted with optical sights. The main drawback of the rifles is the inability to engage enemy soldiers wearing class III and IV armored vests with hard plates based on kevlar and on boron or silicon carbides.

It is also believed that due to deficiencies inherent to automatic weapons for the caseless cartridge (likelihood of self-ignition of the cartridge in the chamber, unstable accuracy with a heated barrel) and due to the impossibility of taking the density of automatic fire to highest intensity ahead of the FEBA at critical moments of battle, the Heckler und Koch small arms system will not be able to offer serious competition to small arms of the classic scheme. Foreign specialists assert that the Colt rifle possesses the best characteristics in the ACR program. It is possible for it to fire any modern 5.56-mm ammunition, and when firing duplex cartridges there is an increase in projectile stream density and in kill probability against enemy personnel.

One of the basic tasks facing foreign weapon developers is to increase the armor penetrating ability of the 7.62x51-mm standard NATO cartridge intended for assault rifles and machineguns. For example, the Belgian firm of FN developed a new SS123 rifle bullet according to the scheme of the M855 5.56-mm cartridge bullet. Compared with the standard cartridge bullet, it is heavier (9.95 g) and has higher muzzle velocity (865 m/sec). Its penetrating power was increased 1.5 times thanks to the presence of a chilled steel core and lead sabot. The creation of cartridges with bullet designs having tungsten carbide cores also is reported.

The United States is developing a new sniper rifle for the powerful 8.58-mm cartridge, which is to replace the

authorized M21. According to press information, specialists of a number of countries have proposed different versions of sniper rifles for 12.7-mm and 14.5-mm cartridges intended for engaging APC's and IFV's at ranges up to 1,000 m. It is reported that until recently the U.S. M2HB 12.7-mm Browning machinegun has been practically the sole representative of heavy-caliber machineguns in the inventory of armies of over 20 world countries. The United States presently has developed a new heavy machinegun, the Dover Devil, which permits firing both from 12.7-mm as well as 20-mm barrels.

A number of firms are modernizing 12.7-mm cartridges being used as ammunition for machineguns installed in IFV's, tanks, self-propelled artillery mounts and small craft. It is believed that subcaliber bullets should have a heavy, armor-piercing core, but foreign specialists think that in this case the effectiveness of engaging armored targets at a range above 1,000 m will not be improved substantially. In the opinion of the Belgian military, it is more advisable to develop for this purpose a machinegun for the 15x115-mm cartridge with armor piercing-incendiary bullets having a hard-alloy core and depleted uranium core.

Customs Service Continues

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[Interview with Nikolay Alekseyevich Lyutov, chief of Western Customs Administration, by Colonel O. Sedykh and Colonel (Reserve) N. Penzev, occasion, date and place not specified, under rubric "At Your Request"; photograph of Lyutov included]

[FBIS Translated Text] *The Army is being cut back, and one and the very same question is heard more and more often in letters to the editors: What profession should be given preference in civilian life? The profession of customs official, believes N. Lyutov, chief of the Western Customs Administration. We offer the conversation with him to our readers.*

[Sedykh] Why specifically a customs official, Nikolay Alekseyevich?

[Lyutov] Because in my view, customs official is one of few specialties where a former officer can fully realize knowledge and skills acquired in the Army, which means also adapting more easily under new conditions after discharge to the reserve. A customs official is a person who simply has to be able to estimate the surrounding situation instantaneously and make the correct decision quickly. He also has to understand people and be extremely self-restrained and proper. I think you will agree with me that a captain or major who has commanded a subunit for more than a single year and who has gone through the crucible of exercises and "hot spots" possesses these qualities to the full

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extent. This is why priority is given to officers in choosing candidates for work in customs.

The "rating" of people in shoulderboards has risen even more in connection with the fact that security subunits and quick reaction detachments now are being set up with customs entities. The majority of vacancies in them naturally will be offered to former servicemen.

[Sedykh] Could you discuss this in more detail?

[Lyutov] One of the most important missions of customs that is becoming more and more difficult to perform is to stop the smuggling of valuable raw materials, antiques and drugs. And it is not only because there has been a sharp increase lately in the number of people consciously striving to break the law in exporting (or importing) commodities. The actions of some of them, joined in criminal groupings, are distinguished by special boldness and create a threat to the life of customs officials and to the normal functioning of our services.

Considering the situation at hand, the Russian Federation President issued an Edict under which customs entities are categorized as state paramilitary organizations. Their combat nucleus will be those same subunits and detachments mentioned above. They are called upon to provide security for customhouses, to react promptly to illegal actions of criminal structures, and to carry out special measures in the interests of ensuring reliable customs inspection.

It is clear that the training of these units will be very specific and rather intensive, but knowledge and skills acquired in the course of Army service will become its basis.

[Sedykh] Let's assume, Nikolay Alekseyevich, that for particular reasons a former officer still is not fascinated with service in quick reaction detachments. It turns out then that the path to customs is ordered for him?

[Lyutov] By no means. Yes, we very much need specialists for security of customs installations and to fight smuggling, but qualified personnel also are needed to no less an extent in the area of customs statistics, customs rate regulation, and legal and logistical support. And here, I believe, former servicemen also can find worthy use for themselves.

[Sedykh] But the fact is, a company or battalion commander is very far removed from those same statistics.

[Lyutov] But no one plans to toss them entirely into the pool immediately. We have a rather precisely worked out system of basic training at workstations under the observation of mentors. In addition, professional-economic study classes are held regularly in customhouses under the approved program. Novices also are "passed" through training centers, where they not only

master the theoretical training course, but also later undergo two months of on-site OJT.

And those who are capable of more and who meet corresponding parameters are welcome in our educational institutions. Above all this is the Russian Customs Academy—the decision to establish it was made by the Russian Federation Government not very long ago. Along with boys who have completed secondary school or the customs college, our authorized personnel with a higher education also will undergo two years of on-campus training here in the "Customs Work" specialty. I am convinced there will be many reserve officers among them.

The departments of customs law at Moscow State Institute of International Relations, Moscow State Open University and Ural State Legal Academy also guarantee qualified training.

[Sedykh] During his time of service an officer has become accustomed to a rather guaranteed, albeit small, set of specific benefits. What can customs offer him in this regard?

[Lyutov] A lot. For example, just like servicemen, customs officials do not pay income tax. With respect to pay, it consists of position pay, pay for special rank, increments for knowing a foreign language and for length of service (this also includes the period of military service if the break between the day of discharge to the reserve and the day accepted for work in customs does not exceed one year), monthly compensatory payment for meals, a rated increase to position pay for special work conditions, and material assistance for treatment before going on leave.

In addition, officials of customs entities are given an annual paid leave lasting 30 calendar days, not counting time of travel to and from the vacation place, with the travel cost paid. Our personnel also have the right to an additional leave: 5 calendar days after 10 years of service in customs, 10 calendar days after 15 years and 15 calendar days after 20 years.

The fact also would appear very indicative that customs officials, like servicemen, use all kinds of public transportation of urban, suburban and local communication (except taxis) free on Russian Federation territory and have the right to preferential payment (in the amount of 50 percent) for living space and public utilities.

[Sedykh] And how are things with pensions?

[Lyutov] Pension support of customs personnel and their families is accomplished by the Russian Federation State Customs Committee as applied to the conditions, norms and procedure established for persons who have performed military service and service in internal affairs entities. By the way, our retirees also

receive treatment—free naturally, as in the Army—in those medical establishments where they previously were registered.

[Sedykh] Judging from the specifics of customs missions being performed, you basically require people who are young and healthy. But is there an opportunity for a military retiree or officer close to retirement age to become a customs official?

[Lyutov] Without question. Fifteen former officers are working directly in the Administration itself alone, not counting customhouses. All are military retirees. And under the law, along with wages owed, all are fully paid the pension for Armed Forces service. We never strived for an artificial rejuvenation of cadres. To the contrary, we often give preference to people who are mature and have abundant life experience. So let those who are over 40 and even over 50 not worry: if they meet necessary requirements, work in customs is guaranteed them.

[Sedykh] What kind of requirements are these?

[Lyutov] I already spoke of them above in general terms. To be more specific, it is desirable that a person who plans to become a customs official have good health, the necessary set of high moral and psychological qualities, positive performance appraisals from the place of previous service, and a higher or at least secondary specialized education.

[Sedykh] Nikolay Alekseyevich, you have general's shoulderboards on your shoulders and you wear a very smart uniform. Are ranks and uniforms authorized everyone in customs?

[Lyutov] Yes, everyone. Only our ranks are not military, but special. For example, I am a state customs service adviser 2nd rank. And they are conferred in accordance with the position held. As in the Army, the uniform is issued free. And it must be said that customs officials wear it with pleasure.

[Sedykh] It so happened that the apartment question in the Army probably became the most painful one in recent years. Does an officer who has become a customs official have any hope at all of solving it?

[Lyutov] This problem also is no simple one for us, but we are solving it. Now many customhouses are building housing for their personnel on participatory terms, considering that funds for this are allocated rather regularly. So there is hope, and very real hope, for a customs official to receive an apartment.

[Sedykh] And the final question. Let's assume that having read this article, an officer decided to become a customs official. Where should he turn? Travel to Moscow and look up your Administration?

[Lyutov] This does not have to be done. Our customhouses are located in many oblast cities in the European part of Russia. Those for whom they are closer to the place of residence should refer there. And I hope you will publish the addresses and telephone numbers of these customhouses in the journal as an appendix to our discussion.

[Sedykh] Definitely, Nikolay Alekseyevich. Thank you for the interview.

[Lyutov] And thank you as well for the attention to our service.

Addresses of Western Customs Administration Customhouses

1. Belgorod Customhouse	308600, Belgorod, ul. Krasina, 9a	2-63-73
2. Bryansk Customhouse	241027, Bryansk, ul. 50-y Armii, 18	55-12-27
3. Vladimir Customhouse	600036, Vladimir, Moskovskoye shosse, 5a	4-50-85
4. Voronezh Customhouse	394968, Voronezh, ul. Solnechnaya, 9a	48-15-81
5. Ivanovo Customhouse	153004, Ivanovo, ul. 9 Yanvarya, 7	37-64-15
6. Kaluga Customhouse	248001, Kaluga, ul. Suvorova, 121	4-65-49
7. Kostroma Customhouse	156000, Kostroma, ul. Simonovskogo, 105	55-70-62
8. Kursk Customhouse	305000, Kursk, ul. K. Marksa, 53	33-75-47
9. Lipetsk Customhouse	398037, Lipetsk, Trubnyy proyezd, 3	26-48-65
10. Orel Customhouse	302030, Orel, nab. Dubrovinskogo, 70	3-79-45
11. Ryazan Customhouse	390013, Ryazan, ul. Kalyayeva, 53	55-34-66
12. Smolensk Customhouse	214032, Smolensk, ul. Lavochkina, 105	2-37-20
13. Tambov Customhouse	392000, Tambov, ul. Internatsionalnaya, 3a	47-17-13
14. Tver Customhouse	170000, Tver, pr-4 Chaykovskogo, 28/2	2-54-22
15. Tula Customhouse	300600, Tula, ul. Sovetskaya, 112	32-29-18
16. Yaroslavl Customhouse	150014, Yaroslavl, ul. Bogdanovicha, 10	32-08-64

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